

Electrical Sector Solutions

# Volume 4: Circuit Protection

**EATON**

*Powering Business Worldwide*

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## Dimensions, Weights and Ratings

Dimensions, weights and ratings given in this catalog **are approximate and should not be used for construction purposes**. Drawings containing exact dimensions are available upon request. All listed product specifications and ratings are subject to change without notice. Photographs are representative of production units.

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This catalog contains brief technical data for proper selection of products. Further information is available in the form of technical information publications and illustrated brochures. If additional product information is required, contact your local Eaton Products Distributor, call **1-800-525-2000** or visit our website at **www.eaton.com**.

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Powering Business Worldwide

## Eaton is a global leader in power distribution, power quality, control and automation, and monitoring products.

At Eaton, we believe a reliable, efficient and safe power system is the foundation of every successful enterprise. Through innovative technologies, cutting-edge products and our highly skilled services team, we empower businesses around the world to achieve a powerful advantage.

In addition, Eaton is committed to creating and maintaining powerful customer relationships built on a foundation of excellence. From the products we manufacture to our dedicated customer service and support, we know what's important to you.

## Solutions

Eaton takes the complexity out of power systems management with a holistic and strategic approach, leveraging our industry-leading technology, solutions and services. We focus on the following three areas in all we do:

- Reliability—maintain the appropriate level of power continuity without disruption or unexpected downtime
- Efficiency—minimize energy usage, operating costs, equipment footprint and environmental impact
- Safety—identify and mitigate electrical hazards to protect what you value most

## Using the Eaton Catalog Library

As we grow, it becomes increasingly difficult to include all products in one or two comprehensive catalogs. Knowing that each user has their specific needs, we have created a library of catalogs for our products that when complete, will contain 15 volumes. Since the volumes will continuously be a work in progress and updated, each volume will stand alone. Refer to our volume directory, MZ08100001E, for a quick glance of where to look for the products you need. The 15 volumes include:

- Volume 1—Residential and Light Commercial (CA08100002E)
- Volume 2—Commercial Distribution (CA08100003E)
- Volume 3—Power Distribution and Control Assemblies (CA08100004E)
- Volume 4—Circuit Protection (CA08100005E)
- Volume 5—Motor Control and Protection (CA08100006E)
- Volume 6—Solid-State Motor Control (CA08100007E)
- Volume 7—Logic Control, Operator Interface and Connectivity Solutions (CA08100008E)
- Volume 8—Sensing Solutions (CA08100010E)
- Volume 9—Original Equipment Manufacturer (CA08100011E)
- Volume 10—Enclosed Control (CA08100012E)
- Volume 11—Vehicle and Commercial Controls (CA08100013E)
- Volume 12—Aftermarket, Renewal Parts and Life Extension Solutions (CA08105001E)
- Volume 13—Counters, Timers and Tachometers (CA08100015E)—Available in electronic format only
- Volume 14—Fuses (CA08100016E)—Available in electronic format only
- Volume 15—Solar Inverters and Electrical Balance of System (CA08100018E)

These volumes are not all-inclusive of every product, but they are meant to be an overview of our product lines. For our full range of product solutions and additional product information, consult [Eaton.com/electrical](http://Eaton.com/electrical) and other catalogs and product guides in our literature library. These references include:

- The Consulting Application Guide (CA08104001E)
- The Eaton Power Quality Product Guide (COR01FYA)

If you don't have the volume that contains the product or information that you are looking for, not to worry. You can access every volume of the catalog library at [Eaton.com/electrical](http://Eaton.com/electrical) in the Literature Library.

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## Icons



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# Miniature Circuit Breakers and Supplementary Protectors

## Miniature Circuit Breakers and Supplementary Protectors



### 1.1 Industrial Circuit Breakers

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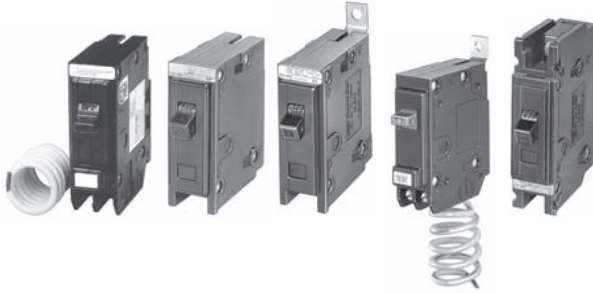
# 1.1

## Miniature Circuit Breakers and Supplementary Protectors

### Industrial Circuit Breakers

1

#### Miniature Circuit Breakers and Supplementary Protectors



#### Contents

##### Description

Quick Reference

## QUICKLAG

### Quick Reference

#### Eaton's QUICKLAG Industrial Circuit Breakers ① Plug-In, Bolt-On, Cable-In/Cable-Out

Circuit Breaker Type	Circuit Breaker Type Code	Continuous Ampere Rating at 40°C	Number of Poles	Federal Spec. W-C-375b		Interrupting Ratings rms Symmetrical Amperes						Page Number	
				Vac	Vdc	Vac Ratings			Vdc Ratings ②				
						120	120/240	240	24–48	62.5	80		
HQP	P	10–70	1	120/240	24, 48, 62.5	10a, 11a, 12a	—	10,000	—	5000	③	—	V4-T1-6
HQP	P	10–125	2	120/240	24, 48, 80	10a, 12a	—	10,000	—	5000	5000	5000	V4-T1-6
HQP	P	10–100	2, 3	240	—	10b, 11b, 12b	—	—	10,000	—	—	—	V4-T1-6
QPHW	P	15–70	1	120/240	24, 48, 62.5	14a	—	22,000	—	5000	③	—	V4-T1-6
QPHW	P	15–125	2	120/240	24, 48, 80	14a	—	22,000	—	5000	5000	5000	V4-T1-6
QPHW	P	15–100	2, 3	240	—	14b	—	—	22,000	—	—	—	V4-T1-6
QHPX	P	15–70	1	120/240	24, 48, 62.5	—	—	42,000	—	5000	③	—	V4-T1-7
QHPX	P	15–100	2	120/240	24, 48, 80	—	—	42,000	—	5000	5000	5000	V4-T1-7
QHPX	P	15–100	3	240	—	—	—	—	42,000	—	—	—	V4-T1-7
QHPW	P	15–30	1	120/240	24, 48, 62.5	15a	—	65,000	—	5000	③	—	V4-T1-7
QHPW	P	15–30	2	120/240	24, 48, 80	15a	—	65,000	—	5000	5000	5000	V4-T1-7
QHPW	P	15–20	3	240	—	15b	—	—	65,000	—	—	—	V4-T1-7
QPGF	P, GF	15–40	1	120	—	10a, 11a, 12a	10,000	—	—	—	—	—	V4-T1-9
QPGF	P, GF	15–50	2	120/240	—	10a, 11a, 12a	—	10,000	—	—	—	—	V4-T1-9

#### Notes

① QUICKLAG circuit breakers are suitable for application in relative humidity 0–95% noncondensing.

② Two-pole DC interrupting ratings based on two poles connected in series. Not UL® listed.

③ 62.5 Vac interrupting rating is 3800 AIC 10–50A and 2500 AIC 55–100A continuous.

Circuit Breaker Type Codes: **P** Plug-In; **B** Bolt-On; **C** Cable-In/Cable-Out; **GF** Ground Fault, 5 mA; **GFEP** Ground Fault, 30 mA.

For Types GHBS, GBHS and BABRP solenoid-operated, remote-controlled circuit breakers, see **Pages V4-T1-31 to V4-T1-36**.

### Eaton's QUICKLAG Industrial Circuit Breakers ① Plug-In, Bolt-On, Cable-In/Cable-Out, continued

Circuit Breaker Type	Circuit Breaker Type Code	Continuous Ampere Rating at 40°C	Number of Poles	Vac		Federal Spec. W-C-375b	Interrupting Ratings rms Symmetrical Amperes					Page Number	
				Vac	Vdc		Vac Ratings	Vdc Ratings ②					
							120	120/240	240	24-48	62.5	80	
QPHGF	P, GF	15-30	1	120	—	10a, 11a, 12a	22,000	—	—	—	—	—	V4-T1-9
QPHGF	P, GF	15-50	2	120/240	—	10a, 11a, 12a	—	22,000	—	—	—	—	V4-T1-9
QPGFEP	P, GFEP	15-40	1	120	—	—	10,000	—	—	—	—	—	V4-T1-9
QPGFEP	P, GFEP	15-50	2	120/240	—	—	—	10,000	—	—	—	—	V4-T1-9
QPHGFEP	P, GFEP	15-30	1	120	—	—	22,000	—	—	—	—	—	V4-T1-9
BABRSP	B	15-30	1	120	—	—	10,000	—	—	—	—	—	V4-T1-12
BABRSP	B	15-30	2	120/240	—	—	—	10,000	—	—	—	—	V4-T1-12
BRRP	P	15-30	1	120	—	—	10,000	—	—	—	—	—	V4-T1-32
BRRP	P	15-30	2	120/240	—	—	—	10,000	—	—	—	—	V4-T1-32
CLRP	P	15-30	1	120	—	—	10,000	—	—	—	—	—	V4-T1-32
CLRP	P	15-30	2	120/240	—	—	—	10,000	—	—	—	—	V4-T1-32
BAB	B	10-70	1	120/240	24, 48, 62.5	10a, 11a, 12a	—	10,000	—	5000	③	—	V4-T1-12
BAB	B	10-125	2	120/240	24, 48, 80	10a, 12a	—	10,000	—	5000	5000	5000	V4-T1-12
BAB	B	10-100	2, 3	240	—	10b, 11b, 12b	—	—	10,000	—	—	—	V4-T1-12
BABRP	B	15-30	1	120	—	—	10,000	—	—	—	—	—	V4-T1-32
BABRP	B	15-30	2	120/240	—	—	—	10,000	—	—	—	—	V4-T1-32
QBAF	B, AF	15-20	1, 2	120/240	—	—	—	10,000	—	—	—	—	V4-T1-15
QBCAF	B, AF, GF	15-20	1, 2	120/240	—	—	—	10,000	—	—	—	—	V4-T1-15
QBHW	B	15-70	1	120/240	24, 48, 62.5	14a	—	22,000	—	5000	③	—	V4-T1-12
QBHW	B	15-125	2	120/240	24, 48, 80	14a	—	22,000	—	5000	5000	5000	V4-T1-12
QBHW	B	15-100	2, 3	240	—	14b	—	—	22,000	—	—	—	V4-T1-12
HBAX	B	15-70	1	120/240	24, 48, 62.5	—	—	42,000	—	5000	③	—	V4-T1-13
HBAX	B	15-100	2	120/240	24, 48, 80	—	—	42,000	—	5000	5000	5000	V4-T1-13
HBAX	B	15-100	3	240	—	—	—	—	42,000	—	—	—	V4-T1-13
HBAW	B	15-30	1	120/240	24, 48, 62.5	15a	—	65,000	—	5000	③	—	V4-T1-13
HBAW	B	15-30	2	120/240	24, 48, 80	15a	—	65,000	—	5000	5000	5000	V4-T1-13
HBAW	B	15-20	3	240	—	15b	—	—	65,000	—	—	—	V4-T1-13
QBGF	B, GF	15-40	1	120	—	10a, 11a, 12a	10,000	—	—	—	—	—	V4-T1-18
QBGF	B, GF	15-50	2	120/240	—	10a, 11a, 12a	—	10,000	—	—	—	—	V4-T1-18
QBHGF	B, GF	15-30	1	120	—	10a, 11a, 12a	22,000	—	—	—	—	—	V4-T1-18
QBHGF	B, GF	15-30	1	120/240	—	10a, 11a, 12a	—	22,000	—	—	—	—	V4-T1-18
QBGFEP	B, GFEP	15-40	1	120	—	—	10,000	—	—	—	—	—	V4-T1-18
QBGFEP	B, GFEP	15-50	2	120/240	—	—	—	10,000	—	—	—	—	V4-T1-18
QBHGFEP	B, GFEP	15-30	1	120	—	—	22,000	—	—	—	—	—	V4-T1-18
QBHGFEP	B, GFEP	15-30	2	120/240	—	—	22,000	22,000	—	—	—	—	V4-T1-18
QC	C	10-70	1	120/240	24, 48, 62.5	10a, 11a, 12a	—	10,000	—	5000	③	—	V4-T1-41
QC	C	10-100	2	120/240	24, 48, 80	10a, 12a	—	10,000	—	5000	5000	5000	V4-T1-41
QC	C	10-100	2, 3, 4	240	—	10b, 11b, 12b	—	—	10,000	—	—	—	V4-T1-41
QCD	C	10-60	1, 2	120/240	24, 48, 62.5	—	10,000	10,000	—	3000	3000	—	V4-T1-23
QCD	C	10-100	2, 3	240	24, 48, 62.5	—	—	10,000	—	3000	3000	—	V4-T1-23
QCF	C	10-60	1, 2	120/240	24, 48, 62.5	—	10,000	10,000	—	3000	3000	—	V4-T1-42

#### Notes

① QUICKLAG circuit breakers are suitable for application in relative humidity 0-95% noncondensing.

② Two-pole DC interrupting ratings based on two poles connected in series. Not UL listed.

③ 62.5 Vac interrupting rating is 3800 AIC 10-50A and 2500 AIC 55-100A continuous.

Circuit Breaker Type Codes: **P** Plug-In; **B** Bolt-On; **C** Cable-In/Cable-Out; **GF** Ground Fault, 5 mA; **GFEP** Ground Fault, 30 mA.

For Types GHBS, GBHS and BABRP solenoid-operated, remote-controlled circuit breakers, see **Pages V4-T1-31 to V4-T1-36**.



## Eaton's QUICKLAG Industrial Circuit Breakers ① Plug-In, Bolt-On, Cable-In/Cable-Out, continued

Circuit Breaker Type	Circuit Breaker Type Code	Continuous Ampere Rating at 40°C	Number of Poles	Federal Spec. W-C-375b			Interrupting Ratings rms Symmetrical Amperes						Page Number
				Vac	Vdc		Vac Ratings			Vdc Ratings ②			
							120	120/240	240	24-48	62.5	80	
QCF	C	15-20	1, 2	120/240	24, 48, 62.5	—	22,000	—	—	3000	3000	—	V4-T1-27
QCF	C	15-30	2, 3	240	24, 48, 62.5	—	—	10,000	—	3000	3000	—	V4-T1-27
QCR	C	10-60	1, 2	120/240	24, 48, 62.5	—	10,000	10,000	—	3000	3000	—	V4-T1-27
QCR	C	15-20	1, 2	120/240	24, 48, 62.5	—	22,000	—	—	3000	3000	—	V4-T1-27
QCR	C	15-30	2, 3	240	24, 48, 62.5	—	—	10,000	—	3000	3000	—	V4-T1-27
QCHW	C	15-70	1	120/240	24, 48, 62.5	14a	—	22,000	—	5000	③	—	V4-T1-22
QCHW	C	15-100	2	120/240	24, 48, 80	14a	—	22,000	—	5000	5000	5000	V4-T1-22
QCHW	C	15-100	2, 3	240	—	14b	—	—	22,000	—	—	—	V4-T1-22
QHCX	C	15-70	1	120/240	24, 48, 62.5	—	—	42,000	—	5000	③	—	V4-T1-22
QHCX	C	15-100	2	120/240	24, 48, 80	—	—	42,000	—	5000	5000	5000	V4-T1-22
QHCX	C	15-100	3	240	—	—	—	—	42,000	—	—	—	V4-T1-22
QHCW	C	15-30	1	120/240	24, 48, 62.5	15a	—	65,000	—	5000	③	—	V4-T1-22
QHCW	C	15-30	2	120/240	24, 48, 80	15a	—	65,000	—	5000	5000	5000	V4-T1-22
QHCW	C	15-20	3	240	—	15b	—	—	65,000	—	—	—	V4-T1-22
QCGF	C, GF	15-40	1	120	—	—	10,000	—	—	—	—	—	V4-T1-29
QCGF	C, GF	15-50	2	120/240	—	—	—	10,000	—	—	—	—	V4-T1-29
QCHGF	C, GF	15-30	1	120	—	—	22,000	—	—	—	—	—	V4-T1-29
QCHGF	C, GF	15-30	2	120/240	—	—	—	22,000	—	—	—	—	V4-T1-29
QCGFEP	C, GFEP	15-40	1	120	—	—	10,000	—	—	—	—	—	V4-T1-29
QCGFEP	C, GFEP	15-50	2	120/240	—	—	—	10,000	—	—	—	—	V4-T1-29
QCHGFEP	C, GFEP	15-30	1	120	—	—	22,000	—	—	—	—	—	V4-T1-29
QCHGFEP	C, GFEP	15-30	2	120/240	—	—	—	22,000	—	—	—	—	V4-T1-29

**Notes**

① QUICKLAG circuit breakers are suitable for application in relative humidity 0–95% noncondensing.

② Two-pole DC interrupting ratings based on two poles connected in series. Not UL listed.

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For Types GHBS, GBHS and BABRP solenoid-operated, remote-controlled circuit breakers, see **Pages V4-T1-31 to V4-T1-36**.

### QUICKLAG Type HQP Single-Pole



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### QUICKLAG Plug-On Types HQP, QPHW, QHPX, QHPW

#### Product Description

- All products 15–100A are HACR rated
- Switching duty rated for 120 Vac fluorescent light applications

#### Standards and Certifications

- Built and listed to UL 489
- All products UL and CSA® listed



## Product Selection

QUICKLAG Type HQP  
Single-Pole

## QUICKLAG Type: HQP 10,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number
10	HQP1010	HQP2010	—	HQP3010H ③
15	HQP1015 ①②	HQP2015	HQP2015H	HQP3015H
20	HQP1020 ①②	HQP2020	HQP2020H	HQP3020H
25	HQP1025	HQP2025	HQP2025H	HQP3025H
30	HQP1030	HQP2030	HQP2030H	HQP3030H
35	HQP1035	HQP2035	HQP2035H	HQP3035H
40	HQP1040	HQP2040	HQP2040H	HQP3040H
45	HQP1045	HQP2045	HQP2045H	HQP3045H
50	HQP1050	HQP2050	HQP2050H	HQP3050H
55	HQP1055	HQP2055	HQP2055H	HQP3055H
60	HQP1060	HQP2060	HQP2060H	HQP3060H
70	HQP1070	HQP2070	HQP2070H	HQP3070H
80	—	HQP2080	HQP2080H	HQP3080H
90	—	HQP2090	HQP2090H	HQP3090H
100	HQP1100	HQP2100	HQP2100H	HQP3100H
110	—	HQP2110	—	—
125	—	HQP2125	—	—
150	—	HQP2150	—	—

## QUICKLAG Type: HQP Non-Automatic Switches

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number
50	HQP1050N	—	HQP2050N	HQP3050N
60	HQP1060N	—	HQP2060N	HQP3060N
100	HQP1100N	—	HQP2100N	HQP3100N

## QUICKLAG Type: QPHW 22,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number
15	QPHW1015 ①	QPHW2015	QPHW2015H	QPHW3015H
20	QPHW1020 ①	QPHW2020	QPHW2020H	QPHW3020H
25	QPHW1025	QPHW2025	QPHW2025H	QPHW3025H
30	QPHW1030	QPHW2030	QPHW2030H	QPHW3030H
35	QPHW1035	QPHW2035	QPHW2035H	QPHW3035H
40	QPHW1040	QPHW2040	QPHW2040H	QPHW3040H
45	QPHW1045	QPHW2045	QPHW2045H	QPHW3045H
50	QPHW1050	QPHW2050	QPHW2050H	QPHW3050H
55	QPHW1055	QPHW2055	QPHW2055H	QPHW3055H
60	QPHW1060	QPHW2060	QPHW2060H	QPHW3060H
70	QPHW1070	QPHW2070	QPHW2070H	QPHW3070H
80	—	QPHW2080	QPHW2080H	QPHW3080H
90	—	QPHW2090	QPHW2090H	QPHW3090H
100	—	QPHW2100	QPHW2100H	QPHW3100H
110	—	QPHW2110	—	—
125	—	QPHW2125	—	—

**Notes**

- ① Switching duty rated for 120 Vac fluorescent light applications.
- ② For special low-magnetic breaker, order **HQP1015L1** or **HQP1020L1**.
- ③ Not UL listed.

### QUICKLAG Type: QHPX 42,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number
15	QHPX1015 ①	QHPX2015	—	QHPX3015H
20	QHPX1020 ①	QHPX2020	—	QHPX3020H
25	QHPX1025	QHPX2025	—	QHPX3025H
30	QHPX1030	QHPX2030	—	QHPX3030H
35	QHPX1035	QHPX2035	—	QHPX3035H
40	QHPX1040	QHPX2040	—	QHPX3040H
45	QHPX1045	QHPX2045	—	QHPX3045H
50	QHPX1050	QHPX2050	—	QHPX3050H
55	QHPX1055	QHPX2055	—	QHPX3055H
60	QHPX1060	QHPX2060	—	QHPX3060H
70	QHPX1070	QHPX2070	—	QHPX3070H
80	—	QHPX2080	—	QHPX3080H
90	—	QHPX2090	—	QHPX3090H
100	—	QHPX2100	—	QHPX3100H

### QUICKLAG Type: QHPW 65,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number
15	QHPW1015 ①	QHPW2015	—	QHPW3015H
20	QHPW1020 ①	QHPW2020	—	QHPW3020H
25	QHPW1025	QHPW2025	—	—
30	QHPW1030	QHPW2030	—	—

### Dimensions

Approximate Dimensions in Inches (mm)

### Shipping Data

Number of Poles	Carton Quantity	Approximate Weight Lbs (kg)	Dimensions
1	24	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
2	12	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
3	8	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)

### Note

① Switching duty rated for 120 Vac fluorescent light applications.

**QUICKLAG Type QPGF Single-Pole Ground Fault Circuit Breaker**



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### QUICKLAG Plug-On Ground Fault and Equipment Protectors, Types QPGF, QPHGF, QPGFEP, QPHGFEP

#### Product Description

##### **QUICKLAG Ground Fault Circuit Breakers, Class A GFCI**

- 5 mA trip sensitivity

##### **QUICKLAG Ground Fault Equipment Protectors**

- 30 mA trip sensitivity

#### Standards and Certifications

- Built and listed to UL 489

##### **QUICKLAG Ground Fault Circuit Breakers, Class A GFCI**

- Built and tested to UL 943

##### **QUICKLAG Ground Fault Equipment Protectors**

- Built and listed to UL 1053



### Product Selection

#### QUICKLAG Type QPGF Single-Pole



#### Ground Fault Circuit Breakers—5 mA Sensitivity QUICKLAG Type: QPGF 10,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole	Two-Pole
	120 Vac Catalog Number	120/240 Vac Catalog Number
15	QPGF1015	QPGF2015
20	QPGF1020	QPGF2020
25	QPGF1025	QPGF2025
30	QPGF1030	QPGF2030
40	QPGF1040	QPGF2040
50	—	QPGF2050

#### QUICKLAG Type: QPHGF 22,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole	Two-Pole
	120 Vac Catalog Number	120/240 Vac Catalog Number
15	QPHGF1015	QPHGF2015
20	QPHGF1020	QPHGF2020
25	QPHGF1025	QPHGF2025
30	QPHGF1030	QPHGF2030

#### Ground Fault Equipment Breakers—30 mA Sensitivity QUICKLAG Type: QPGFEP 10,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole	Two-Pole
	120 Vac Catalog Number	120/240 Vac Catalog Number
15	QPGFEP1015	QPGFEP2015
20	QPGFEP1020	QPGFEP2020
25	QPGFEP1025	QPGFEP2025
30	QPGFEP1030	QPGFEP2030
40	QPGFEP1040	QPGFEP2040
50	—	QPGFEP2050

#### QUICKLAG Type: QPHGFEP 22,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole	Two-Pole
	120 Vac Catalog Number	120/240 Vac Catalog Number
15	QPHGFEP1015	QPHGFEP2015
20	QPHGFEP1020	QPHGFEP2020
25	QPHGFEP1025	QPHGFEP2025
30	QPHGFEP1030	QPHGFEP2030

### Special Application Ground Fault Circuit Protectors—5 mA Sensitivity QUICKLAG Type: QPGF 10,000A Interrupting Capacity with Bell Alarm (W1) or Auxiliary Switch (W2)

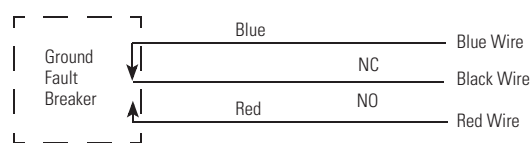
Continuous Ampere Rating at 40°C	Single-Pole	Two-Pole
	120 Vac Catalog Number	120/240 Vac Catalog Number
15	QPGF1015W1	QPGF2015W1
20	QPGF1020W1	QPGF2020W1
25	QPGF1025W1	QPGF2025W1
30	QPGF1030W1	QPGF2030W1
40	—	QPGF2040W1
50	—	QPGF2050W1
15	QPGF1015W2	—
20	QPGF1020W2	—
25	QPGF1025W2	—
30	QPGF1030W2	—

### Special Application Ground Fault Circuit Protectors—30 mA Sensitivity QUICKLAG Type: QPGFEP 10,000A Interrupting Capacity with Bell Alarm (W1) or Auxiliary Switch (W2)

Continuous Ampere Rating at 40°C	Single-Pole	Two-Pole
	120 Vac Catalog Number	120/240 Vac Catalog Number
15	QPGFEP1015W1	QPGFEP2015W1
20	QPGFEP1020W1	QPGFEP2020W1
25	QPGFEP1025W1	QPGFEP2025W1
30	QPGFEP1030W1	QPGFEP2030W1
40	—	QPGFEP2040W1
50	—	QPGFEP2050W1
15	QPGFEP1015W2	—
20	QPGFEP1020W2	—
25	QPGFEP1025W2	—
30	QPGFEP1030W2	—

## Wiring Diagram

### Bell Alarm and Auxiliary Contact Schematic



Single-throw double-pole contacts are UL and CSA listed for 5A at 250 Vac.

Bell Alarm (W1)—contacts change state when breaker trips.

Auxiliary Switch (W2)—contacts change state when breaker is opened (or tripped) or closed.

14-inch (355.6 mm) long 18 AWG pigtail wire leads provided.

## Dimensions

Approximate Dimensions in Inches (mm)

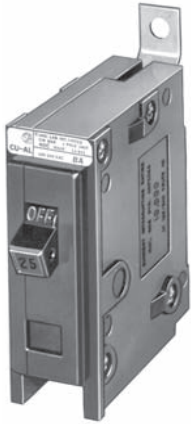
### Shipping Data

Number of Poles	Carton Quantity	Approximate Weight Lbs (kg)	Dimensions
1	24	11.00 (5.0)	12.50 x 6.50 x 5.00 (317.5 x 165.1 x 127.0)
2	5	5.00 (2.3)	15.50 x 6.00 x 4.50 (393.7 x 152.4 x 114.3)

### Note

Shipped individually or in carton quantities.

**QUICKLAG Type BAB Single-Pole**



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### Bolt-On Types BAB, QBHW, HBAX, HBAW

#### Product Description

- All products 15–100A are HACR rated
- Switching duty rated for 120 Vac fluorescent light applications

#### Standards and Certifications

- Built and listed to UL 489
- All products UL and CSA listed





## Product Selection

QUICKLAG Type BAB  
Single-Pole

## QUICKLAG Type: BA 10,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number
10	BAB1010	BAB2010	BAB2010H ③	BAB3010H ③
15	BAB1015 ①②	BAB2015	BAB2015H	BAB3015H
20	BAB1020 ①②	BAB2020	BAB2020H	BAB3020H
25	BAB1025	BAB2025	BAB2025H	BAB3025H
30	BAB1030	BAB2030	BAB2030H	BAB3030H
35	BAB1035	BAB2035	BAB2035H	BAB3035H
40	BAB1040	BAB2040	BAB2040H	BAB3040H
45	BAB1045	BAB2045	BAB2045H	BAB3045H
50	BAB1050	BAB2050	BAB2050H	BAB3050H
55	BAB1055	BAB2055	BAB2055H	BAB3055H
60	BAB1060	BAB2060	BAB2060H	BAB3060H
70	BAB1070	BAB2070	BAB2070H	BAB3070H
80	—	BAB2080	BAB2080H	BAB3080H
90	—	BAB2090	BAB2090H	BAB3090H
100	BAB1100	BAB2100	BAB2100H	BAB3100H
110	—	BAB2110	—	—
125	—	BAB2125	—	—

## QUICKLAG Type: BA Non-Automatic Switches

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number
50	BAB1050N	—	BAB2050N	BAB3050N
60	BAB1060N	—	BAB2060N	BAB3060N
100	BAB1100N	—	BAB2100N	BAB3100N

## QUICKLAG Type: QBHW 22,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number
15	QBHW1015 ①	QBHW2015	QBHW2015H	QBHW3015H
20	QBHW1020 ①	QBHW2020	QBHW2020H	QBHW3020H
25	QBHW1025	QBHW2025	QBHW2025H	QBHW3025H
30	QBHW1030	QBHW2030	QBHW2030H	QBHW3030H
35	QBHW1035	QBHW2035	QBHW2035H	QBHW3035H
40	QBHW1040	QBHW2040	QBHW2040H	QBHW3040H
45	QBHW1045	QBHW2045	QBHW2045H	QBHW3045H
50	QBHW1050	QBHW2050	QBHW2050H	QBHW3050H
55	QBHW1055	QBHW2055	QBHW2055H	QBHW3055H
60	QBHW1060	QBHW2060	QBHW2060H	QBHW3060H
70	QBHW1070	QBHW2070	QBHW2070H	QBHW3070H
80	—	QBHW2080	QBHW2080H	QBHW3080H
90	—	QBHW2090	QBHW2090H	QBHW3090H
100	—	QBHW2100	QBHW2100H	QBHW3100H
110	—	QBHW2110	—	—
125	—	QBHW2125	—	—

**Notes**

- ① Switching duty rated for 120 Vac fluorescent light applications.
- ② For special low-magnetic breaker, order **BAB1015L1** or **BAB1020L1**.
- ③ Not UL listed.

### QUICKLAG Type: HBAX 42,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number
15	HBAX1015 <sup>①</sup>	HBAX2015	—	HBAX3015H
20	HBAX1020 <sup>①</sup>	HBAX2020	—	HBAX3020H
25	HBAX1025	HBAX2025	—	HBAX3025H
30	HBAX1030	HBAX2030	—	HBAX3030H
35	HBAX1035	HBAX2035	—	HBAX3035H
40	HBAX1040	HBAX2040	—	HBAX3040H
45	HBAX1045	HBAX2045	—	HBAX3045H
50	HBAX1050	HBAX2050	—	HBAX3050H
55	HBAX1055	HBAX2055	—	HBAX3055H
60	HBAX1060	HBAX2060	—	HBAX3060H
70	HBAX1070	HBAX2070	—	HBAX3070H
80	—	HBAX2080	—	HBAX3080H
80	—	HBAX2080	—	HBAX3080H
90	—	HBAX2090	—	HBAX3090H
100	—	HBAX2100	—	HBAX3100H

### QUICKLAG Type: HBAW 65,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number
15	HBAW1015 <sup>①</sup>	HBAW2015	—	HBAW3015H
20	HBAW1020 <sup>①</sup>	HBAW2020	—	HBAW3020H
25	HBAW1025	HBAW2025	—	—
30	HBAW1030	HBAW2030	—	—

### Dimensions

Approximate Dimensions in Inches (mm)

### Shipping Data

Number of Poles	Carton Quantity	Approximate Weight Lbs (kg)	Dimensions
1	24	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
2	12	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
3	8	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)

### Note

<sup>①</sup> Switching duty rated for 120 Vac fluorescent light applications.

**Bolt-On Arc Fault Circuit Interrupter QUICKLAG Types QBAF, QBCAF**



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Cable-In/Cable-Out Ground Fault and Equipment Protectors, Types QCGF, QCHGF, QCGFEP, QCHGFEP	<b>V4-T1-28</b>
Solenoid-Operated, Remote-Controlled Latching Types BABRP, BABRSP, BRRP and CLRP. . . . .	<b>V4-T1-31</b>
Solenoid Operator—Remote Controlled Latching for Type GHBS, GBHS and GHORSP Breakers . . . . .	<b>V4-T1-34</b>
International Rated Types HQP, BA, QC, GFMB, GFXBC	<b>V4-T1-37</b>
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**Bolt-On Arc Fault Circuit Interrupter Types QBAF, QBCAF**

**Product Description**

- All products HACR rated

**Features, Benefits and Functions**

- 10 and 22 kAIC rating at 120V and 120/240V
- Single-pole AFCI
- HID ratings for HID (High Intensity Discharge) lighting
- All models are HACR rated

**Standards and Certifications**

- Built and listed to UL 489
- UL File E7819 for QBAF



### Product Selection

#### **QBCAF and QBAF Type AFCIs**

Effective immediately, Eaton AFCIs are available for use in Sumter panels with a 22 kAIC rating. This higher rated breaker will allow us to win jobs where AFCIs are specified at higher than 10 kAIC. This breaker provides standard thermal-

magnetic protection of branch circuits. This product will have the same form, fit and function of the current bolt-on AFCI (QBCAF and QBAF Type). Product scope is below. These breakers are in Bid Manager™ for Pow-R-Line 1a, Pow-R-Line 1a-LX,

Pow-R-Line 3a and Pow-R-Line 4a panelboards. For series rated combinations, continue to use the less expensive 10 kAIC QBCAF and QBAF offerings.

Breakers can also be ordered from Vista.

#### **QBHCAF**

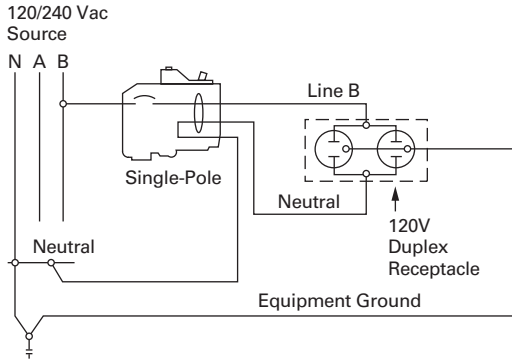


#### **1-Inch (25.4 mm) Wide Bolt-On Arc Fault Circuit Interrupter**

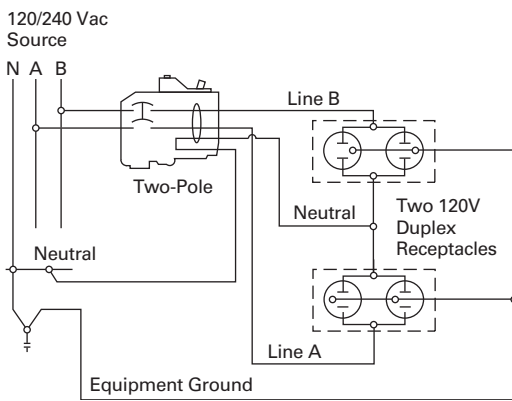
Poles	kAIC Rating	Ampere Rating	Configuration	Catalog Number
<b>Type QBCAF Combination AFCI</b>				
Single-pole	10 kAIC	15	Combination AFCI	<b>QBCAF1015</b>
		20	Combination AFCI	<b>QBCAF1020</b>
	22 kAIC	15	Combination AFCI	<b>QBHCAF1015</b>
		20	Combination AFCI	<b>QBHCAF1020</b>
<b>Type QBAF Branch Feeder AFCI</b>				
Single-pole	10 kAIC	15	Branch Feeder AFCI	<b>QBAF1015</b>
		20	Branch Feeder AFCI	<b>QBAF1020</b>
	22 kAIC	15	Branch Feeder AFCI	<b>QBHAF1015</b>
		20	Branch Feeder AFCI	<b>QBHAF1020</b>

## Wiring Diagrams

### Single-Pole 120V Load Application Sourced by 120/240 Vac



### Single-Pole Shared Neutral with Multi-Duplex Receptacle Application



**QUICKLAG Type QBGF Single-Pole Ground Fault Circuit Breaker**



### Bolt-On Ground Fault and Equipment Protectors, Types QBGF, QBHGF, QBGFEP, QBHGFEP

**Product Description**

**QUICKLAG Ground Fault Circuit Breakers, Class A GFCI**

- 5 mA trip sensitivity

**QUICKLAG Ground Fault Equipment Protectors**

- 30 mA trip sensitivity

**Standards and Certifications**

- Built and tested to UL 489

**QUICKLAG Ground Fault Circuit Breakers, Class A GFCI**

- Built and tested to UL 943

**QUICKLAG Ground Fault Equipment Protectors**

- Built and tested to UL 1053



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## Product Selection

QUICKLAG Type QBGF  
Single-Pole
**Ground Fault Circuit Breakers—5 mA Sensitivity QUICKLAG Type:  
QBGF 10,000A Interrupting Capacity Thermal-Magnetic Breakers**

Continuous Ampere Rating at 40°C	Single-Pole	Two-Pole
	120 Vac Catalog Number	120/240 Vac Catalog Number
15	QBGF1015	QBGF2015
20	QBGF1020	QBGF2020
25	QBGF1025	QBGF2025
30	QBGF1030	QBGF2030
40	QBGF1040	QBGF2040
50	—	QBGF2050

**QUICKLAG Type: QBHGF 22,000A Interrupting Capacity  
Thermal-Magnetic Breakers**

Continuous Ampere Rating at 40°C	Single-Pole	Two-Pole
	120 Vac Catalog Number	120/240 Vac Catalog Number
15	QBHGF1015	QBHGF2015
20	QBHGF1020	QBHGF2020
25	QBHGF1025	QBHGF2025
30	QBHGF1030	QBHGF2030

**Ground Fault Equipment Breakers—30 mA Sensitivity QUICKLAG Type:  
QBGFEP 10,000A Interrupting Capacity Thermal-Magnetic Breakers**

Continuous Ampere Rating at 40°C	Single-Pole	Two-Pole
	120 Vac Catalog Number	120/240 Vac Catalog Number
15	QBGFEP1015	QBGFEP2015
20	QBGFEP1020	QBGFEP2020
25	QBGFEP1025	QBGFEP2025
30	QBGFEP1030	QBGFEP2030
40	QBGFEP1040	QBGFEP2040
50	—	QBGFEP2050

**QUICKLAG Type: QBHGFEP 22,000A Interrupting Capacity  
Thermal-Magnetic Breakers**

Continuous Ampere Rating at 40°C	Single-Pole	Two-Pole
	120 Vac Catalog Number	120/240 Vac Catalog Number
15	QBHGFEP1015	QBHGFEP2015
20	QBHGFEP1020	QBHGFEP2020
25	QBHGFEP1025	QBHGFEP2025
30	QBHGFEP1030	QBHGFEP2030

### Special Application Ground Fault Circuit Protectors—5 mA Sensitivity QUICKLAG Type: QBGF 10,000A Interrupting Capacity with Bell Alarm (W1) or Auxiliary Switch (W2)

Continuous Ampere Rating at 40°C	Single-Pole	Two-Pole
	120 Vac Catalog Number	120/240 Vac Catalog Number
15	QBGF1015W1	QBGF2015W1
20	QBGF1020W1	QBGF2020W1
25	QBGF1025W1	QBGF2025W1
30	QBGF1030W1	QBGF2030W1
40	—	QBGF2040W1
50	—	QBGF2050W1
15	QBGF1015W2	—
20	QBGF1020W2	—
25	QBGF1025W2	—
30	QBGF1030W2	—

### Special Application Ground Fault Circuit Protectors—30 mA Sensitivity QUICKLAG Type: QBGFEP 10,000A Interrupting Capacity with Bell Alarm (W1) or Auxiliary Switch (W2)

Continuous Ampere Rating at 40°C	Single-Pole	Two-Pole
	120 Vac Catalog Number	120/240 Vac Catalog Number
15	QBGFEP1015W1	QBGFEP2015W1
20	QBGFEP1020W1	QBGFEP2020W1
25	QBGFEP1025W1	QBGFEP2025W1
30	QBGFEP1030W1	QBGFEP2030W1
40	—	QBGFEP2040W1
50	—	QBGFEP2050W1
15	QBGFEP1015W2	—
20	QBGFEP1020W2	—
25	QBGFEP1025W2	—
30	QBGFEP1030W2	—

## Wiring Diagram

### Bell Alarm and Auxiliary Contact Schematic



Single-throw double-pole contacts are UL and CSA listed for 5A at 250 Vac.  
 Bell Alarm (W1)—contacts change state when breaker trips.  
 Auxiliary Switch (W2)—contacts change state when breaker is opened (or tripped) or closed.  
 14-inch (355.6 mm) long 18 AWG pigtail wire leads provided.

## Dimensions

Approximate Dimensions in Inches (mm)

### Shipping Data

Number of Poles	Approximate Weight Lbs (kg)	Dimensions
1	11.00 (5.0)	12.50 x 6.50 x 5.00 (317.5 x 165.1 x 127.0)
2	5.00 (2.3)	15.50 x 6.00 x 4.50 (393.7 x 152.4 x 114.3)

### Note

Shipped individually or in carton quantities.



**QUICKLAG Type QC Single-Pole**



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**Cable-In/Cable-Out Types QC, QCD, QCHW, QHCX, QHCW**

**Product Description**

- All products 10–100A are HACR rated
- Switching duty rated for 120 Vac fluorescent light applications only

**Standards and Certifications**

- Built and listed to UL 489
- All products UL and CSA listed



### Product Selection

**QUICKLAG**  
Type QC Single-Pole



#### QUICKLAG Type: QC 10,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number	Four-Pole 240 Vac Catalog Number
5	QC1005 ①	QC2005 ①	—	—	—
10	QC1010	QC2010	QC2010H ①	QC3010H ①	—
15	QC1015 ②	QC2015	QC2015H	QC3015H	QC4015H
20	QC1020 ②	QC2020	QC2020H	QC3020H	QC4020H
25	QC1025	QC2025	QC2025H	QC3025H	QC4025H
30	QC1030	QC2030	QC2030H	QC3030H	QC4030H
35	QC1035	QC2035	QC2035H	QC3035H	QC4035H
40	QC1040	QC2040	QC2040H	QC3040H	QC4040H
45	QC1045	QC2045	QC2045H	QC3045H	QC4045H
50	QC1050	QC2050	QC2050H	QC3050H	QC4050H
55	QC1055	QC2055	QC2055H	QC3055H	QC4055H
60	QC1060	QC2060	QC2060H	QC3060H	QC4060H
70	QC1070	QC2070	QC2070H	QC3070H	QC4070H
70	—	QC2080	QC2080H	QC3080H	QC4080H
90	—	QC2090	QC2090H	QC3090H	QC4090H
100	QC1100	QC2100	QC2100H	QC3100H	QC4100H

#### QUICKLAG Type: QC Non-Automatic Switches

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number	Four-Pole 240 Vac Catalog Number
50	QC1050N	—	QC2050N	QC3050N	—
60	QC1060N	—	QC2060N	QC3060N	—
100	QC1100N	—	QC2100N	QC3100N	—

#### Notes

① Not UL listed.

② Switching duty rated for 120 Vac fluorescent light applications only.

For special low-magnetic breaker, order **QC1015L1** or **QC1020L1**. Non-automatic switches, see **Page V4-T1-42**.

**QUICKLAG Type: QCHW 22,000A Interrupting Capacity Thermal-Magnetic Breakers**

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number	Four-Pole 240 Vac Catalog Number
15	QCHW1015 ①	QCHW2015	QCHW2015H	QCHW3015H	QCHW4015H
20	QCHW1020 ①	QCHW2020	QCHW2020H	QCHW3020H	QCHW4020H
25	QCHW1025	QCHW2025	QCHW2025H	QCHW3025H	QCHW4025H
30	QCHW1030	QCHW2030	QCHW2030H	QCHW3030H	QCHW4030H
35	QCHW1035	QCHW2035	QCHW2035H	QCHW3035H	QCHW4035H
40	QCHW1040	QCHW2040	QCHW2040H	QCHW3040H	QCHW4040H
45	QCHW1045	QCHW2045	QCHW2045H	QCHW3045H	QCHW4045H
50	QCHW1050	QCHW2050	QCHW2050H	QCHW3050H	QCHW4050H
55	QCHW1055	QCHW2055	QCHW2055H	QCHW3055H	QCHW4055H
60	QCHW1060	QCHW2060	QCHW2060H	QCHW3060H	QCHW4060H
70	QCHW1070	QCHW2070	QCHW2070H	QCHW3070H	QCHW4070H
70	—	QCHW2080	QCHW2080H	QCHW3080H	QCHW4080H
90	—	QCHW2090	QCHW2090H	QCHW3090H	QCHW4090H
100	—	QCHW2100	QCHW2100H	QCHW3100H	QCHW4100H

**QUICKLAG Type: QHCX 42,000A Interrupting Capacity Thermal-Magnetic Breakers**

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number	Four-Pole 240 Vac Catalog Number
15	QHCX1015 ①	QHCX2015	—	QHCX3015H	—
20	QHCX1020 ①	QHCX2020	—	QHCX3020H	—
25	QHCX1025	QHCX2025	—	QHCX3025H	—
30	QHCX1030	QHCX2030	—	QHCX3030H	—
35	QHCX1035	QHCX2035	—	QHCX3035H	—
40	QHCX1040	QHCX2040	—	QHCX3040H	—
45	QHCX1045	QHCX2045	—	QHCX3045H	—
50	QHCX1050	QHCX2050	—	QHCX3050H	—
55	QHCX1055	QHCX2055	—	QHCX3055H	—
60	QHCX1060	QHCX2060	—	QHCX3060H	—
70	QHCX1070	QHCX2070	—	QHCX3070H	—
70	—	QHCX2080	—	QHCX3080H	—
90	—	QHCX2090	—	QHCX3090H	—
100	—	QHCX2100	—	QHCX3100H	—

**QUICKLAG Type: QHCW 65,000A Interrupting Capacity Thermal-Magnetic Breakers**

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number	Four-Pole 240 Vac Catalog Number
15	QHCW1015 ①	QHCW2015	—	QHCW3015H	—
20	QHCW1020 ①	QHCW2020	—	QHCW3020H	—
25	QHCW1025	QHCW2025	—	—	—
30	QHCW1030	QHCW2030	—	—	—

**Notes**

① Switching duty rated for 120 Vac fluorescent light applications only.

Non-automatic switches, see **Page V4-T1-42**.

### QUICKLAG Type QCD Miniature Circuit Breakers

QCD breakers are used primarily in HVAC and industrial applications.

- Single-, two- and three-pole options
- Modular construction
- DIN mounted (symmetrical rail 35 x 7.5 DIN/EN 50 022)
- QCD same profile as Type QCR
- Flexible power feed connection: wire size, position
- Same breaker size for entire rating range
- Field mountable accessories: finger shroud proof, quick connect terminals
- Other accessories: jumper unit

**QUICKLAG Type QCD Miniature Circuit Breaker**



### QUICKLAG Type QCD 10,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole	Two-Pole	Two-Pole	Three-Pole
	120/240 Vac Catalog Number	120/240 Vac Catalog Number	240 Vac Catalog Number	240 Vac Catalog Number
10	QCD1010	QCD2010	—	—
15	QCD1015	QCD2015	QCD2015H	QCD3015H
20	QCD1020	QCD2020	QCD2020H	QCD3020H
25	QCD1025	QCD2025	QCD2025H	QCD3025H
30	QCD1030	QCD2030	QCD2030H	QCD3030H
35	QCD1035	QCD2035	QCD2035H	QCD3035H
40	QCD1040	QCD2040	QCD2040H	QCD3040H
45	QCD1045	QCD2045	QCD2045H	QCD3045H
50	QCD1050	QCD2050	QCD2050H	QCD3050H
55	QCD1055	QCD2055	QCD2055H	QCD3055H
60	QCD1060	QCD2060	QCD2060H	QCD3060H
70	—	QCD2070	QCD2070H	QCD3070H
80	—	QCD2080	QCD2080H	QCD3080H
90	—	QCD2090	QCD2090H	QCD3090H
100	—	QCD2090	QCD2090H	QCD3100H
	—	QCD2100	QCD2100H	—

### QUICKLAG Type QCD Non-Automatic Switches

Continuous Ampere Rating at 40°C	Single-Pole	Two-Pole	Two-Pole	Three-Pole
	120/240 Vac Catalog Number	120/240 Vac Catalog Number	240 Vac Catalog Number	240 Vac Catalog Number
60	—	—	QCD2060NA	—
100	—	—	—	—

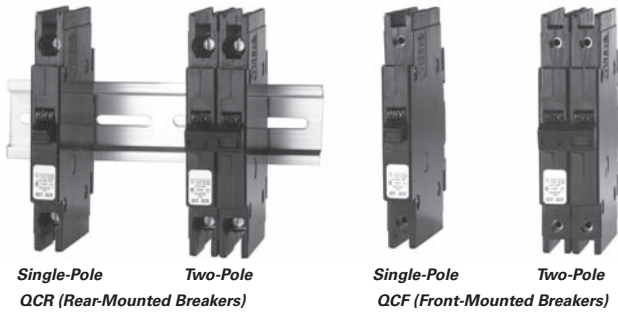
### Dimensions

Approximate Dimensions in Inches (mm)

### Shipping Data

Number of Poles	Carton Quantity	Approximate Weight Lbs (kg)	Dimensions
1	24	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
2	12	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
3	8	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)

**Cable-In/Cable-Out, 1/2-Inch Wide, Types QCR, QCF, QCRH, QCFH**



Single-Pole Two-Pole  
QCR (Rear-Mounted Breakers)

Single-Pole Two-Pole  
QCF (Front-Mounted Breakers)

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**Cable-In/Cable-Out, 1/2-Inch Wide, Types QCR, QCF, QCRH, QCFH**

**Product Description**

Eaton Type QCR circuit breakers have as a standard feature provisions for 35 mm DIN rail rear mounting with a spring-loaded release. Optional clips for individual mounting are available as a separate accessory.

Type QCF have two threaded steel inserts to facilitate front mounting with #6–32 steel screws. The clamp type terminals are accessible from the rear of the breaker so that cables can be accessed without removal of the breaker from the front cover.

**Application Description**

QCR and QCF circuit breakers are only 1/2-inch (12.7 mm) wide per pole and are excellent for general purpose industrial applications where space savings is required.

**Features, Benefits and Functions**

- 1/2-inch (12.7 mm) wide per pole
- Cable-in/cable-out
- Black cases with black handles
- Three position handle: ON, Tripped (center), OFF
- Thermal-magnetic protection

**Standards and Certifications**

- Built and listed to UL 489
- UL File No. E7819
- CSA File No. LR48907
- Type QCR and QCF circuit breakers are UL listed circuit breakers that are suitable for use as branch circuit protectors
- All ratings 15–60A are HACR rated



### Product Selection

Cable-In/Cable-Out,  
1/2-Inch Wide



#### QCR Breaker Catalog Numbers <sup>①②③④</sup>

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac <sup>⑤</sup> Catalog Number	Three-Pole Catalog Number
<b>QCR Breaker 10 kAIC Interrupting Ratings</b>				
10	QCR1010	QCR2010	—	—
	QCR1010T	QCR2010T	—	—
	—	QCR2010P	—	—
15	QCR1015 <sup>⑥</sup>	QCR2015	QCR2015H	QCR3015H
	QCR1015T <sup>⑥</sup>	QCR2015T	QCR2015HT	QCR3015HT
	—	QCR2015P	—	—
20	QCR1020 <sup>⑥</sup>	QCR2020	QCR2020H	QCR3020H
	QCR1020T <sup>⑥</sup>	QCR2020T	QCR2020HT	QCR3020HT
	—	QCR2020P	—	—
25	QCR1025	QCR2025	QCR2025H	QCR3025H
	QCR1025T	QCR2025T	QCR2025HT	QCR3025HT
	—	QCR2025P	—	—
30	QCR1030	QCR2030	QCR2030H	QCR3030H
	QCR1030T	QCR2030T	QCR2030HT	QCR3030HT
	—	QCR2030P	—	—
35	QCR1035	QCR2035	—	—
	—	QCR2035P	—	—
40	QCR1040	QCR2040	—	—
	—	QCR2040P	—	—
45	QCR1045	QCR2045	—	—
	—	QCR2045P	—	—
50	QCR1050	QCR2050	—	—
	—	QCR2050P	—	—
55	QCR1055	QCR2055	—	—
	—	QCR2055P	—	—
60 <sup>⑦</sup>	QCR1060	QCR2060	—	—
	—	QCR2060P	—	—
<b>QCR Breaker 22 kAIC Interrupting Ratings</b>				
15	QCRH1015 <sup>⑥</sup>	QCRH2015	—	—
	QCRH1015T <sup>⑥</sup>	QCRH2015T	—	—
20	QCRH1020 <sup>⑥</sup>	QCRH2020	—	—
	QCRH1020T <sup>⑥</sup>	QCRH2020T	—	—

#### Notes

- ① Standard breaker terminals are box type lugs.
- ② Breakers with **T** Catalog Number Suffix are suitable for line and load side ring terminal connection (#10–32 plus/minus terminal screw provided).
- ③ Breakers with **P** Catalog Number Suffix are suitable for terminating two 10 AWG Quick-Connect Type Terminals per phase on breaker load side.
- ④ Breakers with Shunt Trip (extra pole required on breaker right-hand side) are available on single-, two- and three-pole. Contact the Customer Support Center at 1-800-356-1243.
- ⑤ Breakers with **H** Catalog Suffix have 240 Vac construction.
- ⑥ All 15 and 20A single-pole breakers are SWD (Switching Duty) rated for fluorescent lighting applications.
- ⑦ 60/75°C Cu/Al wire on all ratings except 60A, which requires Cu only conductor.

Cable-In/Cable-Out,  
1/2-Inch Wide



#### QCF Breaker Catalog Numbers <sup>①②③</sup>

Continuous Ampere Rating at 40°C	Single-Pole	Two-Pole	Two-Pole	Three-Pole
	120/240 Vac Catalog Number	120/240 Vac Catalog Number	240 Vac <sup>④</sup> Catalog Number	Catalog Number
<b>QCF Breaker 10 kAIC Interrupting Ratings</b>				
10	QCF1010	QCF2010	—	—
	QCF1010T	QCF2010T	—	—
15	QCF1015 <sup>⑤</sup>	QCF2015	QCF2015H	QCF3015H
	QCF1015T <sup>⑤</sup>	QCF2015T	QCF2015HT	QCF3015HT
20	QCF1020 <sup>⑤</sup>	QCF2020	QCF2020H	QCF3020H
	QCF1020T <sup>⑤</sup>	QCF2020T	QCF2020HT	QCF3020HT
25	QCF1025	QCF2025	QCF2025H	QCF3025H
	QCF1025T	QCF2025T	QCF2025HT	QCF3025HT
30	QCF1030	QCF2030	QCF2030H	QCF3030H
	QCF1030T	QCF2030T	QCF2030HT	QCF3030HT
35	QCF1035	QCF2035	—	—
40	QCF1040	QCF2040	—	—
45	QCF1045	QCF2045	—	—
50	QCF1050	QCF2050	—	—
55	QCF1055	QCF2055	—	—
60 <sup>⑥</sup>	QCF1060	QCF2060	—	—
<b>QCF Breaker 22 kAIC Interrupting Ratings</b>				
15	QCFH1015 <sup>⑤</sup>	QCFH2015	—	—
	QCFH1015T <sup>⑤</sup>	QCFH2015T	—	—
20	QCFH1020 <sup>⑤</sup>	QCFH2020	—	—
	QCFH1020T <sup>⑤</sup>	QCFH2020T	—	—

#### Notes

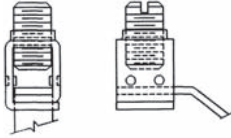
- ① Standard breaker terminals are box type lugs.
- ② Breakers with **T** Catalog Number Suffix are suitable for line and load side ring terminal connection (#10–32 plus/minus terminal screw provided).
- ③ Breakers with Shunt Trip Attachment (extra pole required on breaker right-hand side) are available. Contact the Customer Support Center.
- ④ Breakers with **H** Catalog Suffix have 240 Vac construction.
- ⑤ All 15 and 20A single-pole breakers are SWD (Switching Duty) rated for fluorescent lighting applications.
- ⑥ 60/75°C Cu/Al wire on all ratings except 60A, which requires Cu only conductor.

### QCR and QCF Options and Accessories

#### QCR and QCF Standard Box Terminals

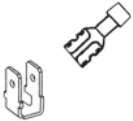
Factory-installed line and load side breaker terminal to accommodate 14 AWG to 4 AWG wire.

#### Standard Box Terminals



#### QCR Quick-Connect Terminals

Factory-installed two-prong quick-connect terminal on breaker load side suitable for terminating two 10 AWG wire with insulated slip-on terminals as shown. Line side terminal is the standard type.

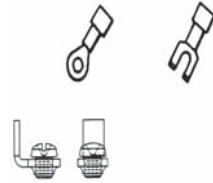


#### Catalog Suffix "P"

#### QCR and QCF Ring or Spade Lug Terminals (10 to 30A Ratings Only)

Factory-installed line and load side terminals each equipped with a #10–32 screw suitable for terminating one 10 AWG wire with insulated ring or spade type terminal as shown.

#### Catalog Suffix "T"



#### Available QCR and QCF Breaker Accessories

Description	Catalog Number
Steel mounting clip mounts QCR breaker if individual mounting is required. Quantity two required for single- and two-pole and four required for three-pole breakers.	<b>QCRMTGFT</b>
Removable padlock device for single-pole QCR or QCF breaker.	<b>QCRFPL1P</b>
Removable padlock device for multi-pole QCR or QCF breaker.	<b>QCRFPLMP</b>
Padlock bracket assembly for QCR or QCF single- or multi-pole breakers (OFF only).	<b>QCRFLOFF</b>
Padlock bracket for QCR, lock-off only.	<b>QCRPLOFF</b>

### Technical Data and Specifications

- Single-, two- and three-pole
- 10 kAIC at 120/240 Vac, 10–60A
- 22 kAIC at 120/240 Vac, 15–20A
- 10 kAIC at 240 Vac, 10–30A
- 3 kAIC at 62.5 Vdc (single-pole)
- 3 kAIC at 130 Vdc (two poles in series)
- Normal operating environment:
  - 0–40°C
  - 5–95% humidity (noncondensing)



**QUICKLAG Type QCGF Single-Pole Ground Fault Circuit Breaker**



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### Cable-In/Cable-Out Ground Fault and Equipment Protectors, Types QCGF, QCHGF, QCGFEP, QCHGFEP

#### Product Description

**QUICKLAG Ground Fault Circuit Breakers, Class A GFCI**

- 5 mA trip sensitivity

**QUICKLAG Ground Fault Equipment Protectors**

- 30 mA trip sensitivity

#### Standards and Certifications

**QUICKLAG Ground Fault Circuit Breakers, Class A GFCI**

- Built and tested to UL 943

**QUICKLAG Ground Fault Equipment Protectors**

- Built and tested to UL 1053



### Product Selection

**QUICKLAG Type QCGF  
Single-Pole Ground  
Fault Circuit Breaker**



### Breaker Catalog Numbers

Continuous Ampere Rating at 40°C	Single-Pole	Two-Pole
	120 Vac Catalog Number	120/240 Vac Catalog Number
<b>Ground Fault Circuit Breakers—5 mA Sensitivity</b>		
<b>QUICKLAG Type: QCGF 10,000A Interrupting Capacity Thermal-Magnetic Breakers</b>		
15	QCGF1015	QCGF2015
20	QCGF1020	QCGF2020
25	QCGF1025	QCGF2025
30	QCGF1030	QCGF2030
40	QCGF1040	QCGF2040
50	—	QCGF2050
<b>QUICKLAG Type: QCHGF 22,000A Interrupting Capacity Thermal-Magnetic Breakers</b>		
15	QCHGF1015	QCHGF2015
20	QCHGF1020	QCHGF2020
25	QCHGF1025	QCHGF2025
30	QCHGF1030	QCHGF2030
<b>Ground Fault Equipment Protectors—30 mA Sensitivity</b>		
<b>QUICKLAG Type: QCGFEP 10,000A Interrupting Capacity Thermal-Magnetic Breakers</b>		
15	QCGFEP1015	QCGFEP2015
20	QCGFEP1020	QCGFEP2020
25	QCGFEP1025	QCGFEP2025
30	QCGFEP1030	QCGFEP2030
40	QCGFEP1040	QCGFEP2040
50	—	QCGFEP2050
<b>QUICKLAG Type: QCHGFEP 22,000A Interrupting Capacity Thermal-Magnetic Breakers</b>		
15	QCHGFEP1015	QCHGFEP2015
20	QCHGFEP1020	QCHGFEP2020
25	QCHGFEP1025	QCHGFEP2025
30	QCHGFEP1030	QCHGFEP2030
<b>Special Application Ground Fault Circuit Protector—5 mA Sensitivity</b>		
<b>QUICKLAG Type: QCGF 10,000A Interrupting Capacity with Bell Alarm (W1) or Auxiliary Switch (W2)</b>		
15	QCGF1015W1	QCGF2015W1
20	QCGF1020W1	QCGF2020W1
25	QCGF1025W1	QCGF2025W1
30	QCGF1030W1	QCGF2030W1
40	—	QCGF2040W1
50	—	QCGF2050W1
15	QCGF1015W2	—
20	QCGF1020W2	—
25	QCGF1025W2	—
30	QCGF1030W2	—
<b>Special Application Ground Fault Equipment Protectors—30 mA Sensitivity</b>		
<b>QUICKLAG Type: QCGFEP 10,000A Interrupting Capacity with Bell Alarm (W1) or Auxiliary Switch (W2)</b>		
15	QCGFEP1015W1	QCGFEP2015W1
20	QCGFEP1020W1	QCGFEP2020W1
25	QCGFEP1025W1	QCGFEP2025W1
30	QCGFEP1030W1	QCGFEP2030W1
40	—	QCGFEP2040W1
50	—	QCGFEP2050W1
15	QCGFEP1015W2	—
20	QCGFEP1020W2	—
25	QCGFEP1025W2	—
30	QCGFEP1030W2	—

# 1

## Wiring Diagram

### Bell Alarm and Auxiliary Contact Schematic



Single-throw double-pole contacts are UL and CSA listed for 5A at 250 Vac.

Bell Alarm (W1)—contacts change state when breaker trips.

Auxiliary Switch (W2)—contacts change state when breaker is opened (or tripped) or closed.

14-inch (355.6 mm) long 18 AWG pigtail wire leads provided.

### Dimensions

Approximate Dimensions in Inches (mm)

### Shipping Data

Number of Poles	Carton Quantity	Approximate Weight Lbs (kg)	Dimensions
1	20	11.00 (5.0)	12.50 x 6.50 x 5.00 (317.5 x 165.1 x 127.0)
2	5	5.00 (2.3)	15.50 x 6.00 x 4.50 (393.7 x 152.4 x 114.3)

**BABRP and BABRSP Breakers—  
Single- and Two-Pole**



### Solenoid-Operated, Remote-Controlled Latching Types BABRP, BABRSP, BRRP and CLRP

#### Product Description

The BABRP and BABRSP are bolt-on branch circuit breakers designed for use in panelboards. The BRRP is a plug-on branch circuit breaker designed for use in load-centers not manufactured with breakers with a 1-inch wide format and are listed on the “Compatibility list for Classified Applications”—Pub. 26271. In addition to providing conventional branch circuit protection, they include a unique solenoid-operated mechanism that provides for efficient breaker pulse-on and pulse-off operation when used with a suitable controller like Eaton’s Pow-R-Command™ lighting control system. These breakers can also be controlled by pushbutton or a PLC unit.

#### Application Description

Eaton’s BABRP, BABRSP, BRRP and CLRP breakers are remotely operated molded case circuit breakers ideally suited for lighting control applications or energy management applications.

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#### Features, Benefits and Functions

- Bolt-on line-side terminal (BABRP, BABRSP—Type BA)
- Plug-on line-side terminal (BRRP—Type BR, CLRP—Type CL)
- Cable connected load-side terminal
- Four-position control terminal
- Bi-metal assembly for thermal overload protection
- Fast-acting short-circuit protection
- Arc-chute assembly for fast-acting arc extinction
- Three-position handle: OFF, TRIP (Center), ON
- Handle permits manual switching when control power is lost
- Mechanical trip indicator
- 15 and 20A breakers SWD (switching duty) rated
- HID ratings for HID (high intensity discharge) lighting
- All models HACR rated
- Status feedback of control circuit (BABRSP)
- Series rated (BABRP, BABRSP only)
  - BRRP series rated same as BR breakers
  - BABRP, BABRSP same as BA breakers

## Product Selection

### QUICKLAG Type QCGF Single-Pole Ground Fault Circuit Breaker



### BABRP UL 489 and CSA 22.2 Interrupting Ratings

Number of Poles	Ampere Rating <sup>①</sup>	Interrupting Capacity (Symmetrical Amperes)			Catalog Number
		Vac (50/60 Hz) 120	120/240	277/480	
1	15	10,000	—	—	BABRP1015
	20	10,000	—	—	BABRP1020
	25	10,000	—	—	BABRP1025
	30	10,000	—	—	BABRP1030
2	15	—	10,000	—	BABRP2015
	20	—	10,000	—	BABRP2020
	25	—	10,000	—	BABRP2025
	30	—	10,000	—	BABRP2030

### BRRP UL 489 and CSA 22.2 Interrupting Ratings

Number of Poles	Ampere Rating	Interrupting Capacity (Symmetrical Amperes)		Catalog Number
		Vac (50/60 Hz) 120	120/240	
1	15	10,000	—	BRRP115
	20	10,000	—	BRRP120
	25	10,000	—	BRRP125
	30	10,000	—	BRRP130
2	15	—	10,000	BRRP215
	20	—	10,000	BRRP220
	25	—	10,000	BRRP225
	30	—	10,000	BRRP230

### BABRP and BABRSP Wire Harness

Description	Catalog Number
This 60-inch (1524.0 mm) wire pigtail provides a connection from a single BABRP's control plug to a customer's pushbutton, relay or PLC. Each box contains 12 pigtails. Wires are 22 AWG, 600V. Order in multiples of 12.	SLBKRPTL1

### BABRSP UL 489 and CSA 22.2 Interrupting Ratings

Number of Poles	Ampere Rating <sup>①</sup>	Interrupting Capacity (Symmetrical Amperes)			Catalog Number
		Vac (50/60 Hz) 120	120/240	277/480	
1	15	10,000	—	—	BABRSP1015
	20	10,000	—	—	BABRSP1020
	25	10,000	—	—	BABRSP1025
	30	10,000	—	—	BABRSP1030
2	15	—	10,000	—	BABRSP2015
	20	—	10,000	—	BABRSP2020
	25	—	10,000	—	BABRSP2025
	30	—	10,000	—	BABRSP2030

### CLRP UL 489 and CSA 22.2 Interrupting Ratings

Number of Poles	Ampere Rating	Interrupting Capacity (Symmetrical Amperes)		Catalog Number
		Vac (50/60 Hz) 120	120/240	
1	15	10,000	—	CLRP115
	20	10,000	—	CLRP120
	25	10,000	—	CLRP125
	30	10,000	—	CLRP130
2	15	—	10,000	CLRP215
	20	—	10,000	CLRP220
	25	—	10,000	CLRP225
	30	—	10,000	CLRP230

#### Note

<sup>①</sup> Continuous current rating at 40°C.

### Technical Data and Specifications

#### Solenoid Operating Data

- Power requirements: 24 Vac/dc (20.4V minimum–30V maximum)
  - Controlled signal: +AC/DC 8 ms minimum with zero cross, 300 ms maximum
- AC: 1.3 cycles minimum, 18 cycles or 300 ms maximum
- DC: 8 ms minimum, 300 ms maximum
- Maximum duty cycle of 6 OPEN/CLOSE cycles per minute
- Current draw: open 1A, close 3/4A
- Blue wire: power input (see power requirements)
- Black wire: remote opening
- Red wire: remote closing
- Yellow wire: feedback status from power input, maximum 0.50A draw (BABRSP only)

#### Operation

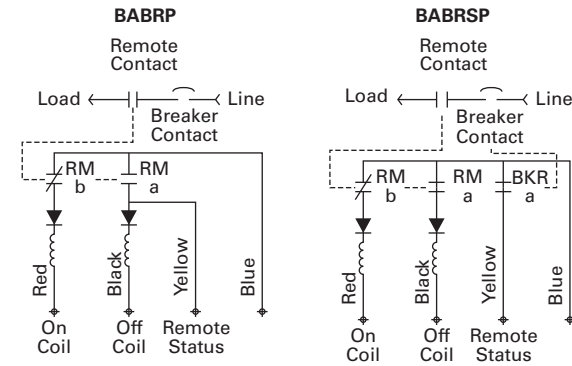
- Tripping system—the BABRP, BABRSP, BRRP and CLRP circuit breakers have a permanent trip unit that contains a factory preset thermal (overload) trip element in each pole
- Operating mechanism—the BABRP, BABRSP, BRRP and CLRP circuit breakers have an over-center toggle mechanism that provides quick-make, quick-break operation. The operating mechanism is trip free. An internal cross-bar provides a common tripping of all multi-pole circuit breakers

#### Operating/Application Data

- Ambient temperature: 0 to 40°C
- Nominal pulse magnitude: 24 Vac/dc
- Frequency: 50/60 Hz
- Maximum breaker cycling: 6 operations per minute
- Tolerance: +10% to –15% of nominal voltage
- Humidity: 0 to 95% noncondensing

### Wiring Diagrams

#### Control Circuit for the BABRP and BABRSP



**GHBS and GHQRSP**



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**Solenoid Operator—Remote-Controlled Latching for Type GHBS, GBHS and GHQRSP Breakers**

**Product Description**

Eaton’s GHBS, GBHS and GHQRSP circuit breakers are bolt-on branch circuit breakers designed for use in 277/480 Vac panelboards. In addition to providing conventional branch circuit protection, they include a unique solenoid-operated mechanism that provides for efficient breaker pulse-on and pulse-off operation when used with a suitable controller like Eaton’s Pow-R-Command lighting control system.

**Features, Benefits and Functions**

- Bolt-on line-side terminal
- Cable-connected load-side terminal
- Status switch—remote status and breaker status available from internal auxiliary switches
- Bi-metal assembly for thermal overload protection
- Fast-acting short-circuit protection
- Arc-runner and arc-chute assembly for fast-acting arc extinction
- Three-position breaker handle: OFF, TRIP (Center), ON
- Visual indication of the remotely operated contact’s position (open, closed or trip)
- Remote override handle permits manual switching when control power is lost
- 15 and 20A breakers SWD (switching duty) rated.
- 15 and 20A breakers HID rated for HID (High intensity discharge) lighting
- All models HACR rated
- Series rated with various Eaton main circuit breakers

### Product Selection

#### GHBS—Single-Pole



#### GHBS UL 489 Interrupting Ratings

Number of Poles	Ampere Rating <sup>①</sup>	Interrupting Capacity (Symmetrical Amperes)			Catalog Number
		Vac (50/60 Hz) 120	240	277/480	
1	15	65,000	—	14,000	GHBS1015D
	20	65,000	—	14,000	GHBS1020D
	30	65,000	—	14,000	GHBS1030D
2	15	—	65,000	14,000	GHBS2015D
	20	—	65,000	14,000	GHBS2020D
	30	—	65,000	14,000	GHBS2030D

#### GBHS CSA 22.2 Interrupting Ratings (Not UL Listed)

Number of Poles	Ampere Rating <sup>①</sup>	Interrupting Capacity (Symmetrical Amperes)		Catalog Number
		Vac (50/60 Hz) 347/600		
1	15	10,000		GBHS1015D
	20	10,000		GBHS1020D
2	15	10,000		GBHS2015D
	20	10,000		GBHS2020D

#### GHQRSP UL 489 and CSA 22.2 Interrupting Ratings

Number of Poles	Ampere Rating <sup>①</sup>	Interrupting Capacity (Symmetrical Amperes)				Catalog Number <sup>②</sup>
		Vac (50/60 Hz) 120	120/240	277	480Y/277	
1	15	65,000	65,000	14,000	14,000	GHQRSP1015
	20	65,000	65,000	14,000	14,000	GHQRSP1020
	30	65,000	65,000	14,000	14,000	GHQRSP1030
2	15	65,000	65,000	14,000	14,000	GHQRSP2015
	20	65,000	65,000	14,000	14,000	GHQRSP2020
	30	65,000	65,000	14,000	14,000	GHQRSP2030

#### Notes

- ① Continuous current rating at 40°C.
- ② All UL listed circuit breakers are HID (high intensity discharge) rated.



### Technical Data and Specifications

#### Solenoid Operating Data

- Power requirements: 24 Vac/dc (20.4V minimum–30V maximum)
  - Controlled signal: +AC/DC 8 ms minimum with zero cross, 300 ms maximum
  - AC: 1.3 cycles minimum, 18 cycles or 300 ms maximum
  - DC: 8 ms minimum, 300 ms maximum
  - Maximum duty cycle of 6 OPEN/CLOSE cycles per minute
- Current draw: open 1A, close 3/4A
- Blue wire: power input (see power requirements)
- Black wire: remote opening

- Red wire: remote closing
- Yellow wire: feedback status from power input, maximum 0.50A draw

#### Operation

Mechanism manually operated by external handle allowing ON, OFF and RESET operation. Handle assumes a center TRIP position after performing protective response.

#### Operating/Application Data

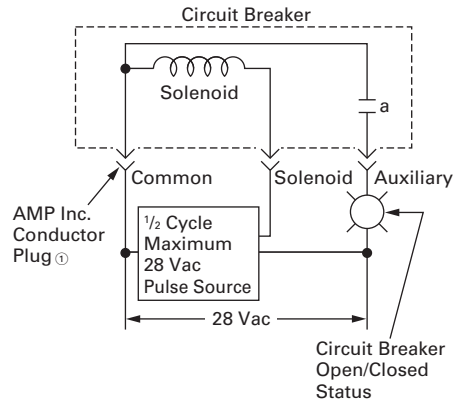
- Ambient temperature: 0–40°C
- Frequency: 48–62 Hz
- Humidity: 0–95% noncondensing

#### Terminal Type

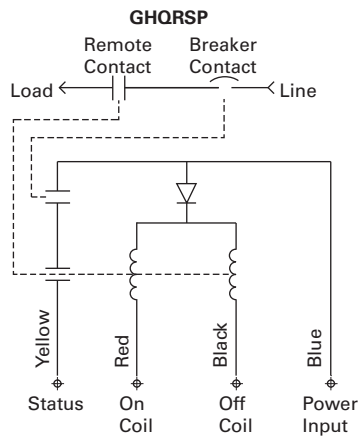
Circuit Breaker Type	Circuit Breaker Amperes	Screw Head Type	Terminal Type	Range
GHQRSP	15–20	Slotted	Clamp	#14–#4 AWG

### Wiring Diagrams

#### Typical Single-Pole Circuit Breaker Schematic Diagram for GBHS and GBHS Breakers



#### Typical Single-Pole Circuit Breaker Schematic Diagram for GHQRSP Breakers



### Dimensions

Approximate Dimensions in Inches (mm)

#### Dimensions per Pole

Circuit Breaker Type	Width	Height <sup>②</sup>	Length <sup>③</sup>
GHQRSP	1.00 (25.4)	4.63 (117.6)	2.81 (71.4)

#### Notes

- ① Purchase separate AMP Inc. conductor plug #640426-3.
- ② Excluding line terminal.
- ③ Excluding handle.

### International Rated



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### International Rated Types HQP, BA, QC, GFMB, GFXBC

#### Product Description

#### **QUICKLAG International Circuit Breakers**

- Bolt-on Type BA

#### **QUICKLAG International Ground Fault Circuit Breakers**

- Plug-on Type GFMB
- Cable-in/cable-out Type GFXBC

#### Standards and Certifications

#### **QUICKLAG International Circuit Breakers**

- Built and test certified to BS3871, Pt. 1
- 50/60 Hz, 40°C

#### **QUICKLAG International Ground Fault Circuit Breakers**

- Built and test certified to BS3871, Pt. 1; BS3871, Section 31-C; BS4293
- 50/60 Hz, 40°C; 30 mA sensitivity

## Product Selection

BAB



## Breaker Catalog Numbers

Continuous Ampere Rating at 40°C	Single-Pole	Two-Pole	Three-Pole
	240/415 Vac Catalog Number	240/415 Vac Catalog Number	240/415 Vac Catalog Number
<b>3000A Interrupting Capacity (M3) Bolt-On Thermal-Magnetic Circuit Breakers</b>			
10	BAB1010E	BAB2010E	BAB3010E
15	BAB1015E	BAB2015E	BAB3015E
16	—	—	—
20	BAB1020E	BAB2020E	BAB3020E
25	BAB1025E	BAB2025E	BAB3025E
30	BAB1030E	BAB2030E	BAB3030E
32	—	—	—
40	BAB1040E	BAB2040E	BAB3040E
50	BAB1050E	BAB2050E	BAB3050E
60	BAB1060E	BAB2060E	BAB3060E
70	BAB1070E	BAB2070E	BAB3070E
90	—	BAB2090E	BAB3090E
100	—	BAB2100E	BAB3100E

## 6000A Interrupting Capacity (M6) Bolt-On Thermal-Magnetic Circuit Breakers

15	BAB1015HE	BAB2015HE	BAB3015HE
20	BAB1020HE	BAB2020HE	BAB3020HE
25	BAB1025HE	BAB2025HE	BAB3025HE
30	BAB1030HE	BAB2030HE	BAB3030HE
40	BAB1040HE	BAB2040HE	BAB3040HE
50	BAB1050HE	BAB2050HE	BAB3050HE
60	BAB1060HE	BAB2060HE	BAB3060HE
70	BAB1070HE	BAB2070HE	BAB3070HE
90	—	BAB2090HE	BAB3090HE
100	—	BAB2100HE	BAB3100HE

## Breaker Catalog Numbers—Ground Fault Single-Pole 30 mA Sensitivity

Continuous Ampere Rating at 40°C	240/415 Vac
	Catalog Number
<b>3000A Interrupting Capacity (M3) Plug-On Thermal-Magnetic Circuit Breakers</b>	
10	GFMB110B2
15	GFMB115B2
16	GFMB116B2
20	GFMB120B2
25	GFMB125B2
30	GFMB130B2
32	GFMB132B2
40	GFMB140B2

**Note**

For other 240/415V applications, please contact the Customer Support Center at 1-800-356-1243.

### Technical Data and Specifications

#### Interrupting Ratings

Ratings	Suffix E	Suffix HE
<b>International Circuit Breakers</b>		
NEMA® 120/240 Vac	10,000 AIC	10,000 AIC
BS3871 220/380, 240/415 Vac	3000 AIC	6000 AIC
<b>International Ground Fault Circuit Breakers</b>		
BS3871 220/380, 240/415 Vac	3000 AIC	

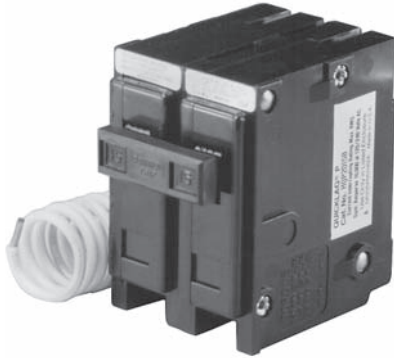
#### Dimensions

Approximate Dimensions in Inches (mm)

#### Shipping Data

Miniature Circuit Breaker	Number of Poles	Standard Carton Quantity	Approximate Carton Weight Lbs (kg)	Approximate Standard Carton
QUICKLAG Type B	1	24	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
	2	12	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
	3	8	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
<b>QUICKLAG Ground Fault</b>				
Type P—All	1	20	11.00 (5.0)	12.50 x 6.50 x 5.00 (317.5 x 165.1 x 127.0)
Types B and C—All	1	20	11.00 (5.0)	12.50 x 7.00 x 5.50 (317.5 x 177.8 x 139.7)
Types P and B—All	2	5	5.00 (2.3)	12.50 x 6.00 x 4.50 (317.5 x 152.4 x 114.3)

**QUICKLAG Type P Switching Neutral**



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QUICKLAG Plug-On Ground Fault and Equipment Protectors, Types QPGF, QPHGF, QPGFEP, QPHGFEP	<b>V4-T1-8</b>
Bolt-On Types BAB, QBHW, HBAX, HBAW . . . . .	<b>V4-T1-11</b>
Bolt-On Arc Fault Circuit Interrupter Types QBAF, QBCAF . . . . .	<b>V4-T1-14</b>
Bolt-On Ground Fault and Equipment Protectors, Types QBGF, QBHGF, QBGFEP, QBHGFEP . . . . .	<b>V4-T1-17</b>
Cable-In/Cable-Out Types QC, QCD, QCHW, QHCX, QHCW . . . . .	<b>V4-T1-20</b>
Cable-In/Cable-Out, 1/2-Inch Wide, Types QCR, QCF, QCRH, QCFH . . . . .	<b>V4-T1-24</b>
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**Special Application Breakers, Types HQP, BA, QC**

**Product Description**

**Breakers**

- Plug-on Type HQP: 10–30A, single- and two-pole, 10 kAIC
- Bolt-on Type BA: 10–30A, single- and two-pole, 10 kAIC
- Cable-in Type QC: 10–30A, single- and two-pole, 10 kAIC

Switching neutral QUICKLAG breakers available in single- and two-pole configurations, plus neutral pole for applications in accordance with NEC® 514.5, 240.22 and 380.2. A single-pole device takes two pole spaces, and a two-pole device takes three pole spaces.

**QUICKLAG HID (High Intensity Discharge) Breakers**

- Plug-on Type HQP: 15–60A, single- and two-pole, 10 kAIC
- Bolt-on Type BA: 15–60A, single- and two-pole, 10 kAIC
- Cable-in Type QC: 15–60A, single- and two-pole, 10 kAIC

Breakers designed specifically for use with high intensity discharge (HID) lighting applications. (UL listed as standard lighting breakers.)

**Molded Case Switches—Non-automatic QUICKLAG Molded Case Switch**

- Plug-on Type HQP: 50, 60, 100A, single-, two- and three-pole
- Bolt-on Type BA: 50, 60, 100A, single-, two- and three-pole
- Cable-in Type QC: 50, 60, 100A, single-, two- and three-pole

**Standards and Certifications**

- All products UL and CSA listed



### Product Selection

QUICKLAG Type P  
Switching Neutral



#### Breaker Catalog Numbers

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number
<b>QUICKLAG Type: HQP Switching Neutral Thermal-Magnetic Breakers</b>				
10	HQP2010B	HQP3010B	—	—
15	HQP2015B	HQP3015B	—	—
20	HQP2020B	HQP3020B	—	—
25	HQP2025B	HQP3025B	—	—
30	HQP2030B	HQP3030B	—	—
<b>QUICKLAG Type: BA Switching Neutral Thermal-Magnetic Breakers</b>				
10	BAB2010C	BAB3010C	—	—
15	BAB2015C	BAB3015C	—	—
20	BAB2020C	BAB3020C	—	—
25	BAB2025C	BAB3025C	—	—
30	BAB2030C	BAB3030C	—	—
<b>QUICKLAG Type: QC Switching Neutral Thermal-Magnetic Breakers</b>				
10	QC2010B	QC3010B	—	—
15	QC2015B	QC3015B	—	—
20	QC2020B	QC3020B	—	—
25	QC2025B	QC3025B	—	—
30	QC2030B	QC3030B	—	—
<b>QUICKLAG Type: HQP HID (High Intensity Discharge) Thermal-Magnetic Breakers</b>				
15	HQP1015D	HQP2015D	—	—
20	HQP1020D	HQP2020D	—	—
25	HQP1025D	HQP2025D	—	—
30	HQP1030D	HQP2030D	—	—
35	HQP1035D	HQP2035D	—	—
40	HQP1040D	HQP2040D	—	—
50	HQP1050D	HQP2050D	—	—
60	HQP1060D	HQP2060D	—	—
<b>QUICKLAG Type: BA HID (High Intensity Discharge) Thermal-Magnetic Breakers</b>				
15	BAB1015D	BAB2015D	—	—
20	BAB1020D	BAB2020D	—	—
25	BAB1025D	BAB2025D	—	—
30	BAB1030D	BAB2030D	—	—
35	BAB1035D	BAB2035D	—	—
40	BAB1040D	BAB2040D	—	—
50	BAB1050D	BAB2050D	—	—
60	BAB1060D	BAB2060D	—	—
<b>QUICKLAG Type: QC HID (High Intensity Discharge) Thermal-Magnetic Breakers</b>				
15	QC1015D	QC2015D	—	—
20	QC1020D	QC2020D	—	—
25	QC1025D	QC2025D	—	—
30	QC1030D	QC2030D	—	—
35	QC1035D	QC2035D	—	—
40	QC1040D	QC2040D	—	—
50	QC1050D	QC2050D	—	—
60	QC1060D	QC2060D	—	—

**Breaker Catalog Numbers, continued**




Continuous Ampere Rating at 40°C	Single-Pole	Two-Pole	Two-Pole	Three-Pole
	120/240 Vac Catalog Number	120/240 Vac Catalog Number	240 Vac Catalog Number	240 Vac Catalog Number
<b>QUICKLAG Type: HQP Non-Automatic Switches</b>				
50	HQP1050N	—	HQP2050N	HQP3050N
60	HQP1060N	—	HQP2060N	HQP3060N
100	HQP1100N	—	HQP2100N	HQP3100N
<b>QUICKLAG Type: BA Non-Automatic Switches</b>				
50	BAB1050N	—	BAB2050N	BAB3050N
60	BAB1060N	—	BAB2060N	BAB3060N
100	BAB1100N	—	BAB2100N	BAB3100N
<b>QUICKLAG Type: QC Non-Automatic Switches</b>				
50	QC1050N	—	QC2050N	QC3050N
60	QC1060N	—	QC2060N	QC3060N
100	QC1100N	—	QC2100N	QC3100N
<b>QUICKLAG Type: QCD Non-Automatic Switches</b>				
60	—	—	QCD2060NA	—
100	—	—	—	—

### Accessories ①

#### Handle Locks: Non-Padlockable ②

	Description	Order in Multiples of	Catalog Number
 <p><b>QL1NPL</b></p>	QUICKLAG Type P, B, C—single-pole	10	<b>QL1NPL</b>
 <p><b>QL23NPL</b></p>	QUICKLAG Type P, B, C—two- and three-pole	10	<b>QL23NPL</b>

#### Handle Locks: Padlockable ②

	Description	Order in Multiples of	Catalog Number
 <p><b>QL1PL</b></p>	QUICKLAG Type P, B, C—single-pole	10	<b>QL1PL</b>
 <p><b>QL123PL</b></p>	QUICKLAG Type P, B and ground fault—single-, two- and three-pole	10	<b>QL123PL</b>
 <p><b>QC123PL</b></p>	QUICKLAG Type C—single-, two- and three-pole	10	<b>QC123PL</b>
	QUICKLAG Type P, B—single-, two- and three-pole (off only)	10	<b>QL123PLOFF</b>
	QUICKLAG Type C—single-, two- and three-pole (off only)	10	<b>QC123PLOFF</b>

#### Notes

- ① See **Page V4-T1-27** for QCR and QCF accessories.
- ② Can lock in ON or OFF position.



#### Mounting Hardware

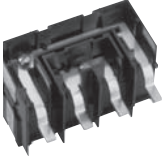
	Description	Order in Multiples of	Catalog Number
	QUICKLAG Type C face mounting clip	24	<b>QCFLIP</b>
	QUICKLAG Type C face mounting plate—single-pole	10	<b>QC1FP</b>
	QUICKLAG Type C face mounting plate—two-pole	10	<b>QC2FP</b>
	QUICKLAG Type C face mounting plate—three-pole	10	<b>QC3FP</b>
	QUICKLAG Type C face mounting plate and lock-off (off only)—two-pole ①	10	<b>QC2FPLOFF</b>
	QUICKLAG Type C face mounting plate and lock-off (off only)—three-pole	10	<b>QC3FPLOFF</b>
	QUICKLAG Type C base mounting clamp	10	<b>QCBCLIP</b>
	QUICKLAG Type mounting plate—six poles total	10	<b>QC6BP</b>

**Note**

① Suitable for ground fault breakers.

### Mounting Hardware, continued

#### QCDJ4



Description	Order in Multiples of	Catalog Number
QUICKLAG Type C base mounting plate—six poles total—heavy-duty screw-secured	10	QC6BPS
QUICKLAG Type C (QCD) 2-way jumper unit with cover	10	QCDJ2
QUICKLAG Type C (QCD) 4-way jumper unit with cover	10	QCDJ4
QUICKLAG Type C (QCD) 6-way jumper unit with cover	10	QCDJ6
QUICKLAG Type C (QCD) 2-way jumper unit, no cover	10	QCDJ2T
QUICKLAG Type C (QCD) 4-way jumper unit, no cover	10	QCDJ4T
QUICKLAG Type C (QCD) 6-way jumper unit, no cover	10	QCDJ6T
QUICKLAG Type QCD Finger protection attachment	10	QCDFP
QUICKLAG Type QCD 4-prong Quick Connect	10	QCQUICK
QUICKLAG Type C DIN rail adapter	6	QCDINADAPT
QUICKLAG Type QCD ring lug attachment	10	QCDRING

#### QCDINADAPT



#### QCDRING



### Dummy Breakers

Description	Order in Multiples of	Catalog Number
QUICKLAG Type P	1	HQP1000
QUICKLAG Type B	1	BAB1000
QUICKLAG Type C	1	QC1000
QUICKLAG Type C clear choice breaker	4	QC30SAMPLE

#### QCRSPACER



### Miscellaneous

Description	Order in Multiples of	Catalog Number
QUICKLAG Type C Spacer	1	QCRSPACER

#### QL1HT



### Handle Tie

Description	Order in Multiples of	Catalog Number
QUICKLAG handle tie—single-pole	100	QL1HT

## Factory Modifications and Installed Terminals

Factory Modifications <sup>①</sup>

Type of Modification	Breaker Type	Catalog Suffix
Shunt trip (requires one extra pole space on right side) 120, 208, 240 Vac Draws 2.6A at 120V, draws 11A at 24 Vdc	QUICKLAG Types P, B and C	<b>S</b>
Shunt trip (requires one extra pole space on right side) 24, 48 Vac/dc Draws 2.6A at 120V, draws 11A at 24 Vdc	QUICKLAG Types P, B and C	<b>S1</b>
Special calibration (50°C) (no UL)	QUICKLAG Types P, B and C	<b>V</b>
Shock testing	QUICKLAG Types P, B and C	<b>L</b>
Freeze testing	QUICKLAG Types P, B and C	<b>Y</b>
Moisture-fungus treatment	QUICKLAG Types P, B, C and ground fault	<b>F</b>
Marine duty	QUICKLAG Types P, B, C	<b>H08</b>
Naval duty	QUICKLAG Types P, B, C	<b>H09</b>
400 Hz calibration	QUICKLAG Types P, B, C	<b>G</b>
Specific DC ratings (breaker marked with a max. Vdc rating)	QUICKLAG Types P, B, C	<b>Q thru Q9</b> <sup>②</sup>

## Spare Terminal Hardware Screws (Lugs not Included)

Terminal Type	Description	Order in Multiples of	Catalog Number
1	QUICKLAG terminal screw	10	<b>QLD TSA</b>
2	QUICKLAG terminal screw	10	<b>QLD TSB</b>
3	QUICKLAG terminal screw	10	<b>QLD TSC</b>
5	QUICKLAG binding head terminal screw and clamp	10	<b>QLB HTSE</b>
6 and 7	QUICKLAG terminal screw	10	<b>QLLNTSFG</b>

**Notes**

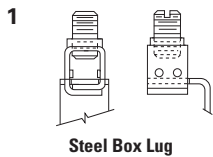
<sup>①</sup> Contact Eaton for factory modifications available for QCR and QCF breakers.

<sup>②</sup> Q = 32 Vdc; Q1 = 32–40 Vdc; Q2 = 37.5 Vdc; Q3 = 45 Vdc; Q4 = 48 Vdc; Q5 = 50 Vdc; Q6 = 62.5 Vdc; Q7 = 75 Vdc (2P); Q8 = 80 Vdc (2P); Q9 = 125 Vdc (QCR 2P); Q10 = 62.5 Vdc (QCR 1P).

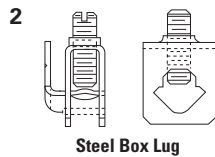
### Technical Data and Specifications

#### Factory-Installed Breaker Terminals

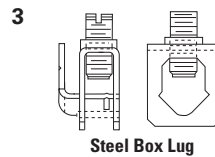
Breaker Type	Continuous Ampere Rating	Standard Line Terminal			Standard Load Terminal			Optional Terminals	
		Terminal Type	Wire Type	Wire Range (AWG)	Terminal Type	Wire Type	Wire Range (AWG)	Line	Load
QUICKLAG Type P HQP, QPHW, QHPX, QHPW	10–30	Plug-on female clips that mate with the bus stabs			1	Cu/Al	14–4	N/A	3
	35–50				2	Cu/Al	14–4	N/A	3
	55–125				3	Cu/Al	8–1/0	N/A	—
QUICKLAG ground fault QPGF, QPGFEP, QPHGF, QPHGFEP	10–40	Plug-on female clips that mate with the bus stabs			1 (single-pole)	Cu/Al	14–4	N/A	3
	10–40				1	Cu/Al	—	N/A	3
	10–30				1	Cu	14–8	N/A	—
QUICKLAG Type B BAB, QBHW, HBAX, HBAW	10–40	Extended tangs that bolt directly to the bus			1 (single- and two-pole)	Cu/Al	14–4	N/A	3
	35–50				2 (three-pole)	Cu/Al	14–4	N/A	3
	55–125				3	Cu/Al	8–1/0	N/A	—
QUICKLAG ground fault QBGF, QBGFEP, QBHGF, QBHGFEP	10–40	Extended tangs that bolt directly to the bus			1 (single-pole)	Cu/Al	14–4	N/A	N/A
	10–40				1	Cu/Al	14–8	N/A	N/A
	10–30				1	Cu	14–8	N/A	N/A
QUICKLAG Type C QC, QCHW, QHCX, QHCW	10–20	5	Cu/Al	TBD	5	Cu/Al	14–10	6, 7	6, 7, 8
	25–60	6	Cu/Al	TBD	2	Cu/Al	14–4	5, 7	5, 6, 7, 8
	70–100	7	Cu/Al	TBD	3	Cu/Al	8–1/0	5	5, 7, 8
QUICKLAG QCR, QCF	10–55	1	Cu/Al	TBD	1	Cu/Al	14–4	N/A	N/A
	60	1	Cu	TBD	1	Cu	14–4	N/A	N/A
QUICKLAG ground fault QCGF, QCGFEP, QCHGF, QCHGFEP	10–20	6	Cu/Al	TBD	14–8	Cu/Al	14–4	6, 7	5
	25–50	6	Cu/Al	TBD	1	Cu/Al	14–4	5, 7	5
	10–30	6	—	—	—	—	—	—	—
QUICKLAG QCD	10–60	9	Cu/Al	14–4	9	Cu/Al	14–4	See Accessories	
	70–100	10	Cu	4–1/0	10	Cu	4–1/0	See Accessories	



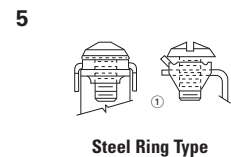
Steel Box Lug



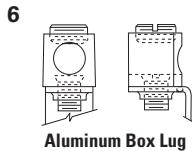
Steel Box Lug



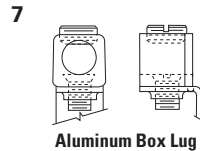
Steel Box Lug



Steel Ring Type



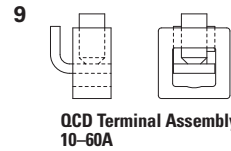
Aluminum Box Lug



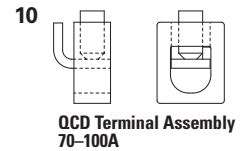
Aluminum Box Lug



4-Prong Quick Connect



QCD Terminal Assembly  
10–60A



QCD Terminal Assembly  
70–100A

**Note**

⊙ Clamp on line side only.

## 1

**Dimensions**

Approximate Dimensions in Inches (mm)

**Shipping Data**

<b>Miniature Circuit Breaker</b>	<b>Number of Poles</b>	<b>Standard Carton Quantity</b>	<b>Approximate Carton Weight Lbs (kg)</b>	<b>Approximate Standard Carton</b>
QUICKLAG Types B, P, C—all	1	24	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
QUICKLAG Types B, P, C—all	2	12	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
QUICKLAG Types B, P, C—all	3	8	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
QUICKLAG ground fault Type P—all	1	20	11.00 (5.0)	12.50 x 6.50 x 5.00 (317.5 x 165.1 x 127.0)
Types B and C—all	1	20	11.00 (5.0)	12.50 x 7.00 x 5.50 (317.5 x 177.8 x 139.7)
Types P and B—all	2	5	5.00 (2.3)	12.50 x 6.00 x 4.50 (317.5 x 152.4 x 114.3)

### FAZ-NA Circuit Breakers



*Optimum and Efficient Protection for Every Application*

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## FAZ-NA Circuit Breakers

### Product Overview

Optimum product quality, tested reliability and safety stand for best protection of personnel, installations and plant. Eaton's FAZ-NA DIN rail mountable circuit breaker is designed for use in branch service applications.

### Powerful Offering for Machine and System Builders

The FAZ-NA is available with B, C and D characteristics in accordance with UL<sup>®</sup> 489, CSA<sup>®</sup> C22.2 No.5; UL 1077, CSA C22.2 No.235 and IEC 60947-2. These devices are CE marked.

### Application Description

Feeder and branch circuit protection for:

- Convenience receptacle circuits (internal/external)
- Motor control circuits
- Load circuits leaving the equipment (external)
- HACR internal/external equipment (heating, air conditioning, refrigeration)
- PLC I/O points
- Computers
- Power supplies
- Control instrumentation
- Relays
- UPS
- Power conditioners

### Features

- Complete range of UL 489 listed DIN rail mounted miniature circuit breakers up to 40A current rating
- Standard ratings of 10 kAIC up to 277/480 Vac
- Select amperages available at 14 kAIC up to 277/480 Vac and 10 kAIC up to 125 Vdc per pole
- Current limiting design provides fast short-circuit interruption that reduces the let-through energy, which can damage the circuit
- Suitable for branch circuit device protection
- Thermal-magnetic overcurrent protection
  - Three levels of short-circuit protection, categorized by B, C and D curves
- Trip-free design—breaker can not be defeated by holding the handle in the ON position
- Captive screws cannot be lost
- SWD (switching duty)—suitable for switching fluorescent lighting loads ( $I_n \leq 20A$ )
- Fulfill UL 489, CSA C22.2 No.5 and also IEC 60947-2 Standard
- For use in applications for which UL 1077 or CSA C22.2 No.235 are also allowed
- Field-installable shunt trip and auxiliary switch subsequent mounting
- Separate version for ring-tongue connection (Type FAZ-RT), terminal screws can be removed (on both sides)
- Module width of only 17.7 mm (per pole)
- Contact Position Indicator (red/green)
- Easy installation on DIN rail
- Possibility for sealing the toggle in ON or OFF position

### Device Printing on Front and Side Installation options

These branch circuit breakers are available in two terminal configurations: standard box terminals that accept multiple conductors and ring-tongue terminals, ideally suited to demanding requirements of the semi-conductor industry. All breakers mount on standard 35 mm DIN rail. Bus connectors and feeder terminal facilitate mounting and wiring of multiple miniature circuit breaker arrays in control panel assemblies. These circuit breakers can also be reverse feed.

# 1.2

## Miniature Circuit Breakers and Supplementary Protectors

### UL 489 DIN Rail Miniature Circuit Breakers

1

#### Standards and Certifications

FAZ-NA complies with the latest national and international standards.

- RoHS compliant
- VDE compliant
- ABS compliant

#### UL 489

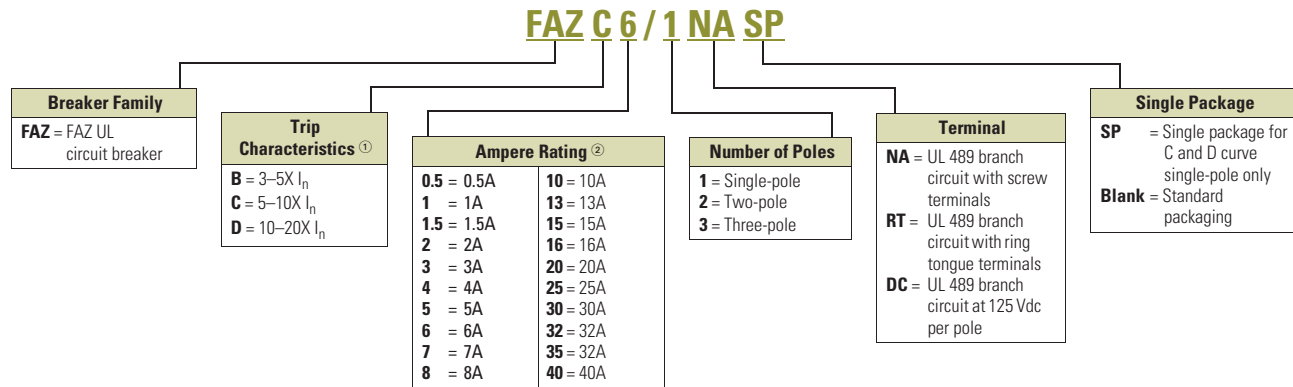
- Standard for molded case circuit breakers (MCCB) for feeder and branch circuit protection
- Products meet the requirements of the National Electrical Code® (NEC®)



#### CSA C22.2 No.5

- Standard for molded case circuit breakers (MCCB) for feeder and branch circuit protection (corresponds closely to UL 489 Standard)
- Products meet the requirements of the Canadian Electrical Code (CEC)

#### Catalog Number Selection



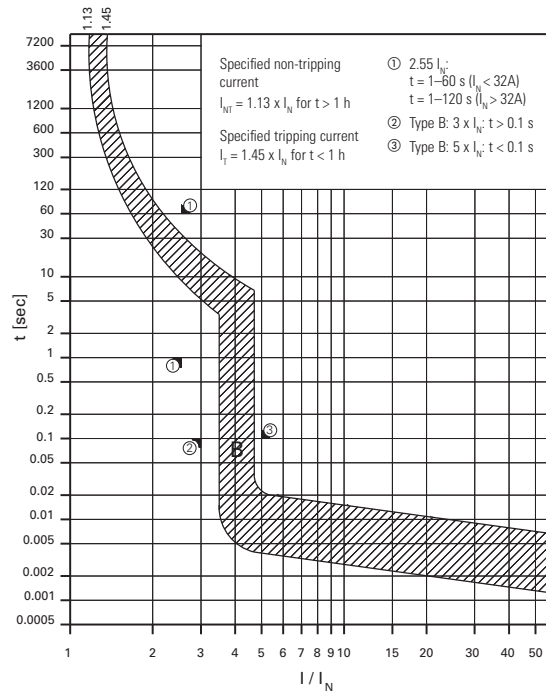
#### Notes

- ① I<sub>n</sub> = Rated current for instantaneous trip characteristics.  
 ② B curve starts at 1 ampere.

### Product Selection

#### FAZ-NA B Curve

- UL approved (UL 489) and CSA Certified (CSA C22.2 No.5-02) as branch circuit breakers
- Interrupting capacity: 10 kA UL/CSA; 15 kA IEC 60947-2
- Current limiting device
- UL file number E235139



#### Single-Pole



#### Two-Pole



#### Three-Pole



### FAZ-NA UL 489 Circuit Breakers— 10 kAIC, 14 kAIC B Curve (15–25A)

Amperes	Single-Pole ① Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number
<b>B Curve (3–5X <math>I_N</math> Current Rating)</b>			
1	FAZ-B1/1-NA	FAZ-B1/2-NA	FAZ-B1/3-NA
1.5	FAZ-B1.5/1-NA	FAZ-B1.5/2-NA	FAZ-B1.5/3-NA
2	FAZ-B2/1-NA	FAZ-B2/2-NA	FAZ-B2/3-NA
3	FAZ-B3/1-NA	FAZ-B3/2-NA	FAZ-B3/3-NA
4	FAZ-B4/1-NA	FAZ-B4/2-NA	FAZ-B4/3-NA
5	FAZ-B5/1-NA	FAZ-B5/2-NA	FAZ-B5/3-NA
6	FAZ-B6/1-NA	FAZ-B6/2-NA	FAZ-B6/3-NA
7	FAZ-B7/1-NA	FAZ-B7/2-NA	FAZ-B7/3-NA
8	FAZ-B8/1-NA	FAZ-B8/2-NA	FAZ-B8/3-NA
10	FAZ-B10/1-NA	FAZ-B10/2-NA	FAZ-B10/3-NA
13	FAZ-B13/1-NA	FAZ-B13/2-NA	FAZ-B13/3-NA
15	FAZ-B15/1-NA	FAZ-B15/2-NA	FAZ-B15/3-NA
16	FAZ-B16/1-NA	FAZ-B16/2-NA	FAZ-B16/3-NA
20	FAZ-B20/1-NA	FAZ-B20/2-NA	FAZ-B20/3-NA
25	FAZ-B25/1-NA	FAZ-B25/2-NA	FAZ-B25/3-NA
30	FAZ-B30/1-NA	FAZ-B30/2-NA	FAZ-B30/3-NA
32	FAZ-B32/1-NA	FAZ-B32/2-NA	FAZ-B32/3-NA
35 ②	FAZ-B35/1-NA	FAZ-B35/2-NA	FAZ-B35/3-NA
40 ②	FAZ-B40/1-NA	FAZ-B40/2-NA	FAZ-B40/3-NA

#### Single-Pole



#### Two-Pole



#### Three-Pole



### FAZ-RT UL 489 Circuit Breakers with Ring-Tongue Terminals— 10 kAIC, 14 kAIC B Curve (15–25A)

Amperes	Single-Pole ① Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number
<b>B Curve with Ring-Tongue Terminals (3–5X <math>I_N</math> Current Rating)</b>			
1	FAZ-B1/1-RT	FAZ-B1/2-RT	FAZ-B1/3-RT
1.5	FAZ-B1.5/1-RT	FAZ-B1.5/2-RT	FAZ-B1.5/3-RT
2	FAZ-B2/1-RT	FAZ-B2/2-RT	FAZ-B2/3-RT
3	FAZ-B3/1-RT	FAZ-B3/2-RT	FAZ-B3/3-RT
4	FAZ-B4/1-RT	FAZ-B4/2-RT	FAZ-B4/3-RT
5	FAZ-B5/1-RT	FAZ-B5/2-RT	FAZ-B5/3-RT
6	FAZ-B6/1-RT	FAZ-B6/2-RT	FAZ-B6/3-RT
7	FAZ-B7/1-RT	FAZ-B7/2-RT	FAZ-B7/3-RT
8	FAZ-B8/1-RT	FAZ-B8/2-RT	FAZ-B8/3-RT
10	FAZ-B10/1-RT	FAZ-B10/2-RT	FAZ-B10/3-RT
13	FAZ-B13/1-RT	FAZ-B13/2-RT	FAZ-B13/3-RT
15	FAZ-B15/1-RT	FAZ-B15/2-RT	FAZ-B15/3-RT
16	FAZ-B16/1-RT	FAZ-B16/2-RT	FAZ-B16/3-RT
20	FAZ-B20/1-RT	FAZ-B20/2-RT	FAZ-B20/3-RT
25	FAZ-B25/1-RT	FAZ-B25/2-RT	FAZ-B25/3-RT
30	FAZ-B30/1-RT	FAZ-B30/2-RT	FAZ-B30/3-RT
32	FAZ-B32/1-RT	FAZ-B32/2-RT	FAZ-B32/3-RT
35 ②	FAZ-B35/1-RT	FAZ-B35/2-RT	FAZ-B35/3-RT
40 ②	FAZ-B40/1-RT	FAZ-B40/2-RT	FAZ-B40/3-RT

#### Notes

- ① Two-piece order. Quantities of two per box.
- ② 240 Vac rated only.



# 1.2

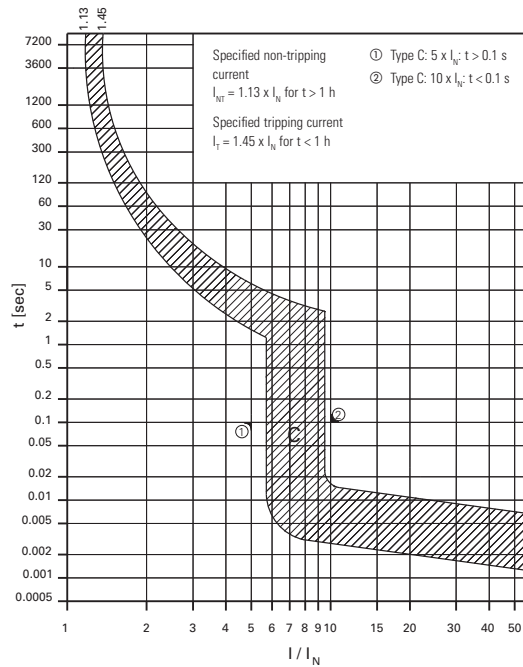
## Miniature Circuit Breakers and Supplementary Protectors

### UL 489 DIN Rail Miniature Circuit Breakers

1

#### FAZ-NA C Curve

- UL approved (UL 489) and CSA Certified (CSA C22.2 No.5-02) as branch circuit breakers
- Interrupting capacity: 10 kA UL/CSA; 15 kA IEC 60947-2
- Current limiting device
- UL file number E235139



#### Single-Pole



#### Two-Pole



#### Three-Pole



#### FAZ-NA UL 489 Circuit Breakers— 10 kAIC, 14 kAIC C Curve (15–25A)

Amperes	Single-Pole ① Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number
<b>C Curve (5–10X I<sub>N</sub> Current Rating)</b>			
0.5	FAZ-C0.5/1-NA-SP	FAZ-C0.5/2-NA	FAZ-C0.5/3-NA
1	FAZ-C1/1-NA-SP	FAZ-C1/2-NA	FAZ-C1/3-NA
1.5	FAZ-C1.5/1-NA-SP	FAZ-C1.5/2-NA	FAZ-C1.5/3-NA
2	FAZ-C2/1-NA-SP	FAZ-C2/2-NA	FAZ-C2/3-NA
3	FAZ-C3/1-NA-SP	FAZ-C3/2-NA	FAZ-C3/3-NA
4	FAZ-C4/1-NA-SP	FAZ-C4/2-NA	FAZ-C4/3-NA
5	FAZ-C5/1-NA-SP	FAZ-C5/2-NA	FAZ-C5/3-NA
6	FAZ-C6/1-NA-SP	FAZ-C6/2-NA	FAZ-C6/3-NA
7	FAZ-C7/1-NA-SP	FAZ-C7/2-NA	FAZ-C7/3-NA
8	FAZ-C8/1-NA-SP	FAZ-C8/2-NA	FAZ-C8/3-NA
10	FAZ-C10/1-NA-SP	FAZ-C10/2-NA	FAZ-C10/3-NA
13	FAZ-C13/1-NA-SP	FAZ-C13/2-NA	FAZ-C13/3-NA
15	FAZ-C15/1-NA-SP	FAZ-C15/2-NA	FAZ-C15/3-NA
16	FAZ-C16/1-NA-SP	FAZ-C16/2-NA	FAZ-C16/3-NA
20	FAZ-C20/1-NA-SP	FAZ-C20/2-NA	FAZ-C20/3-NA
25	FAZ-C25/1-NA-SP	FAZ-C25/2-NA	FAZ-C25/3-NA
30	FAZ-C30/1-NA-SP	FAZ-C30/2-NA	FAZ-C30/3-NA
32	FAZ-C32/1-NA-SP	FAZ-C32/2-NA	FAZ-C32/3-NA
35 ②	FAZ-C35/1-NA-SP	FAZ-C35/2-NA	FAZ-C35/3-NA
40 ②	FAZ-C40/1-NA-SP	FAZ-C40/2-NA	FAZ-C40/3-NA

#### Single-Pole



#### Two-Pole



#### Three-Pole



#### FAZ-RT UL 489 Circuit Breakers with Ring-Tongue Terminals— 10 kAIC, 14 kAIC C Curve (15–25A)

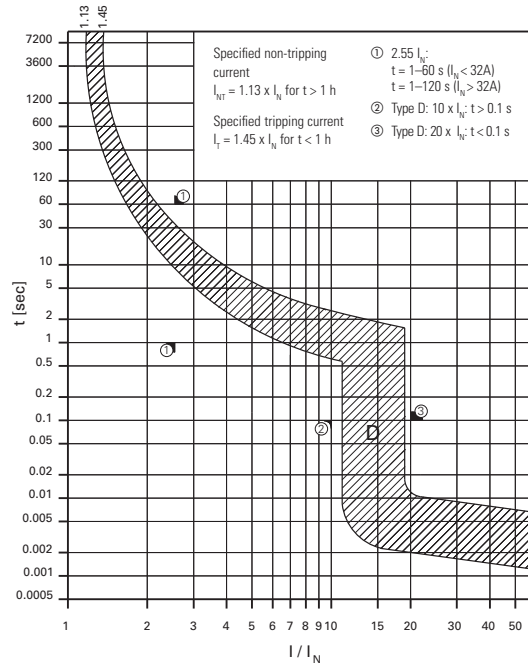
Amperes	Single-Pole ① Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number
<b>C Curve with Ring-Tongue Terminals (5–10X I<sub>N</sub> Current Rating)</b>			
0.5	FAZ-C0.5/1-RT-SP	FAZ-C0.5/2-RT	FAZ-C0.5/3-RT
1	FAZ-C1/1-RT-SP	FAZ-C1/2-RT	FAZ-C1/3-RT
1.5	FAZ-C1.5/1-RT-SP	FAZ-C1.5/2-RT	FAZ-C1.5/3-RT
2	FAZ-C2/1-RT-SP	FAZ-C2/2-RT	FAZ-C2/3-RT
3	FAZ-C3/1-RT-SP	FAZ-C3/2-RT	FAZ-C3/3-RT
4	FAZ-C4/1-RT-SP	FAZ-C4/2-RT	FAZ-C4/3-RT
5	FAZ-C5/1-RT-SP	FAZ-C5/2-RT	FAZ-C5/3-RT
6	FAZ-C6/1-RT-SP	FAZ-C6/2-RT	FAZ-C6/3-RT
7	FAZ-C7/1-RT-SP	FAZ-C7/2-RT	FAZ-C7/3-RT
8	FAZ-C8/1-RT-SP	FAZ-C8/2-RT	FAZ-C8/3-RT
10	FAZ-C10/1-RT-SP	FAZ-C10/2-RT	FAZ-C10/3-RT
13	FAZ-C13/1-RT-SP	FAZ-C13/2-RT	FAZ-C13/3-RT
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16	FAZ-C16/1-RT-SP	FAZ-C16/2-RT	FAZ-C16/3-RT
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25	FAZ-C25/1-RT-SP	FAZ-C25/2-RT	FAZ-C25/3-RT
30	FAZ-C30/1-RT-SP	FAZ-C30/2-RT	FAZ-C30/3-RT
32	FAZ-C32/1-RT-SP	FAZ-C32/2-RT	FAZ-C32/3-RT
35 ②	FAZ-C35/1-RT-SP	FAZ-C35/2-RT	FAZ-C35/3-RT
40 ②	FAZ-C40/1-RT-SP	FAZ-C40/2-RT	FAZ-C40/3-RT

#### Notes

- ① Option for single packaging on single-pole C and D curves only; add suffix SP when ordering.
- ② 240 Vac rated only.

### FAZ-NA D Curve

- UL approved (UL 489) and CSA Certified (CSA C22.2 No.5-02) as branch circuit breakers
- Interrupting capacity: 10 kA UL/CSA; 15 kA IEC 60947-2
- Current limiting device
- UL file number E235139



### Single-Pole



### Two-Pole



### Three-Pole



### FAZ-NA UL 489 Circuit Breakers— 10 kAIC, 14 kAIC D Curve (13–20A)

Amperes	Single-Pole <sup>①</sup> Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number
<b>D Curve (10–20X I<sub>N</sub> Current Rating)</b>			
0.5	FAZ-D0.5/1-NA-SP	FAZ-D0.5/2-NA	FAZ-D0.5/3-NA
1	FAZ-D1/1-NA-SP	FAZ-D1/2-NA	FAZ-D1/3-NA
1.5	FAZ-D1.5/1-NA-SP	FAZ-D1.5/2-NA	FAZ-D1.5/3-NA
2	FAZ-D2/1-NA-SP	FAZ-D2/2-NA	FAZ-D2/3-NA
3	FAZ-D3/1-NA-SP	FAZ-D3/2-NA	FAZ-D3/3-NA
4	FAZ-D4/1-NA-SP	FAZ-D4/2-NA	FAZ-D4/3-NA
5	FAZ-D5/1-NA-SP	FAZ-D5/2-NA	FAZ-D5/3-NA
6	FAZ-D6/1-NA-SP	FAZ-D6/2-NA	FAZ-D6/3-NA
7	FAZ-D7/1-NA-SP	FAZ-D7/2-NA	FAZ-D7/3-NA
8	FAZ-D8/1-NA-SP	FAZ-D8/2-NA	FAZ-D8/3-NA
10	FAZ-D10/1-NA-SP	FAZ-D10/2-NA	FAZ-D10/3-NA
13	FAZ-D13/1-NA-SP	FAZ-D13/2-NA	FAZ-D13/3-NA
15	FAZ-D15/1-NA-SP	FAZ-D15/2-NA	FAZ-D15/3-NA
16	FAZ-D16/1-NA-SP	FAZ-D16/2-NA	FAZ-D16/3-NA
20	FAZ-D20/1-NA-SP	FAZ-D20/2-NA	FAZ-D20/3-NA
25	FAZ-D25/1-NA-SP	FAZ-D25/2-NA	FAZ-D25/3-NA
30	FAZ-D30/1-NA-SP	FAZ-D30/2-NA	FAZ-D30/3-NA
32	FAZ-D32/1-NA-SP	FAZ-D32/2-NA	FAZ-D32/3-NA
35 <sup>②</sup>	FAZ-D35/1-NA-SP	FAZ-D35/2-NA	FAZ-D35/3-NA
40 <sup>②</sup>	FAZ-D40/1-NA-SP	FAZ-D40/2-NA	FAZ-D40/3-NA

### Single-Pole



### Two-Pole



### Three-Pole



### FAZ-RT UL 489 Circuit Breakers with Ring-Tongue Terminals— 10 kAIC, 14 kAIC D Curve (13–20A)

Amperes	Single-Pole <sup>①</sup> Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number
<b>D Curve with Ring-Tongue Terminals (10–20X I<sub>N</sub> Current Rating)</b>			
0.5	FAZ-D0.5/1-RT-SP	FAZ-D0.5/2-RT	FAZ-D0.5/3-RT
1	FAZ-D1/1-RT-SP	FAZ-D1/2-RT	FAZ-D1/3-RT
1.5	FAZ-D1.5/1-RT-SP	FAZ-D1.5/2-RT	FAZ-D1.5/3-RT
2	FAZ-D2/1-RT-SP	FAZ-D2/2-RT	FAZ-D2/3-RT
3	FAZ-D3/1-RT-SP	FAZ-D3/2-RT	FAZ-D3/3-RT
4	FAZ-D4/1-RT-SP	FAZ-D4/2-RT	FAZ-D4/3-RT
5	FAZ-D5/1-RT-SP	FAZ-D5/2-RT	FAZ-D5/3-RT
6	FAZ-D6/1-RT-SP	FAZ-D6/2-RT	FAZ-D6/3-RT
7	FAZ-D7/1-RT-SP	FAZ-D7/2-RT	FAZ-D7/3-RT
8	FAZ-D8/1-RT-SP	FAZ-D8/2-RT	FAZ-D8/3-RT
10	FAZ-D10/1-RT-SP	FAZ-D10/2-RT	FAZ-D10/3-RT
13	FAZ-D13/1-RT-SP	FAZ-D13/2-RT	FAZ-D13/3-RT
15	FAZ-D15/1-RT-SP	FAZ-D15/2-RT	FAZ-D15/3-RT
16	FAZ-D16/1-RT-SP	FAZ-D16/2-RT	FAZ-D16/3-RT
20	FAZ-D20/1-RT-SP	FAZ-D20/2-RT	FAZ-D20/3-RT
25	FAZ-D25/1-RT-SP	FAZ-D25/2-RT	FAZ-D25/3-RT
30	FAZ-D30/1-RT-SP	FAZ-D30/2-RT	FAZ-D30/3-RT
32	FAZ-D32/1-RT-SP	FAZ-D32/2-RT	FAZ-D32/3-RT
35 <sup>②</sup>	FAZ-D35/1-RT-SP	FAZ-D35/2-RT	FAZ-D35/3-RT
40 <sup>②</sup>	FAZ-D40/1-RT-SP	FAZ-C40/2-RT	FAZ-D40/3-RT

### Notes

- ① Option for single packaging on single-pole C and D curves only; add suffix SP when ordering.
- ② 240 Vac rated only.

# 1.2

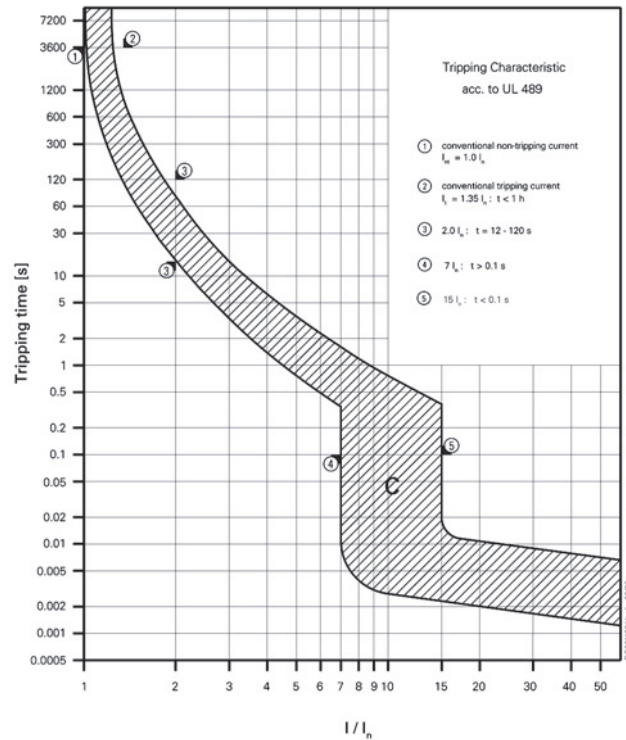
## Miniature Circuit Breakers and Supplementary Protectors

### UL 489 DIN Rail Miniature Circuit Breakers

1

#### FAZ-NA-DC C Curve

- UL approved (UL 489) and CSA Certified (CSA C22.2 No.5-02) as Branch Circuit Breakers
- Interrupting capacity: 10 kA at 125 Vdc UL/CSA, 10 kA at 250 Vdc
- 125 Vdc for one-pole, 250 Vdc for two-pole in series
- Current limiting device
- Polarity (+/-) sensitive and not for use on photovoltaic string application
- UL file number E235139



#### Single-Pole



#### Two-Pole



#### FAZ-NA-DC UL 489 Circuit Breakers— 10 kAIC at 125 Vdc Per Pole





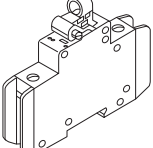
Amperes	Single-Pole ① Catalog Number	Two-Pole Catalog Number
<b>C Curve (5–10X <math>I_n</math> Current Rating)</b>		
2	FAZ-C2/1-NA-DC-SP	FAZ-C2/2-NA-DC
3	FAZ-C3/1-NA-DC-SP	FAZ-C3/2-NA-DC
4	FAZ-C4/1-NA-DC-SP	FAZ-C4/2-NA-DC
5	FAZ-C5/1-NA-DC-SP	FAZ-C5/2-NA-DC
6	FAZ-C6/1-NA-DC-SP	FAZ-C6/2-NA-DC
7	FAZ-C7/1-NA-DC-SP	FAZ-C7/2-NA-DC
8	FAZ-C8/1-NA-DC-SP	FAZ-C8/2-NA-DC
10	FAZ-C10/1-NA-DC-SP	FAZ-C10/2-NA-DC
13	FAZ-C13/1-NA-DC-SP	FAZ-C13/2-NA-DC
15	FAZ-C15/1-NA-DC-SP	FAZ-C15/2-NA-DC
16	FAZ-C16/1-NA-DC-SP	FAZ-C16/2-NA-DC
20	FAZ-C20/1-NA-DC-SP	FAZ-C20/2-NA-DC
25	FAZ-C25/1-NA-DC-SP	FAZ-C25/2-NA-DC
30	FAZ-C30/1-NA-DC-SP	FAZ-C30/2-NA-DC
32	FAZ-C32/1-NA-DC-SP	FAZ-C32/2-NA-DC
35	FAZ-C35/1-NA-DC-SP	FAZ-C35/2-NA-DC
40	FAZ-C40/1-NA-DC-SP	FAZ-C40/2-NA-DC

#### Note



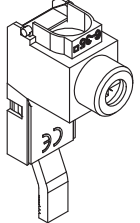

① Option for single packaging on single-pole C curves only; add suffix SP when ordering.

### Accessories

#### FAZ-NA UL 489 Breakers

	Description	Catalog Number
<b>Contact</b> 	Two-pole contact or auxiliary contact/trip indicating contact	<b>Z-NHK</b> <sup>①</sup>
<b>Auxiliary Contact</b> 	Auxiliary contact	<b>Z-IHK-NA</b>
<b>Shunt Trip</b>  	Shunt trip 110–415 Vac Shunt trip 12–110 Vac	<b>FAZ-XAA-NA110-415VAC</b> <b>FAZ-XAA-NA12-110VAC</b>
<b>Padlock Hasp</b> 	Padlock hasp	<b>IS/SPE-1TE</b>

#### FAZ-NA UL 489 Breakers, continued

	Description	Catalog Number
<b>Busbar</b> 	Busbar—single-pole, 6 terminals <sup>②③④⑤</sup>	<b>Z-SV/UL-16/1P-1TE/6</b>
	Busbar—single-pole, 12 terminals <sup>②③④⑤</sup>	<b>Z-SV/UL-16/1P-1TE/12</b>
	Busbar—single-pole, 18 terminals <sup>②③④⑤</sup>	<b>Z-SV/UL-16/1P-1TE/18</b>
	Busbar—two-pole, 6 terminals <sup>②③④⑤</sup>	<b>Z-SV/UL-16/2P-2TE/6</b>
	Busbar—two-pole, 12 terminals <sup>②③④⑤</sup>	<b>Z-SV/UL-16/2P-2TE/12</b>
	Busbar—two-pole, 18 terminals <sup>②③④⑤</sup>	<b>Z-SV/UL-16/2P-2TE/18</b>
	Busbar—three-pole, 6 terminals <sup>②③④⑤</sup>	<b>Z-SV/UL-16/3P-3TE/6</b>
	Busbar—three-pole, 12 terminals <sup>②③④⑤</sup>	<b>Z-SV/UL-16/3P-3TE/12</b>
	Busbar—three-pole, 18 terminals <sup>②③④⑤</sup>	<b>Z-SV/UL-16/3P-3TE/18</b>
<b>Busbar Shroud</b> 	Three-pole busbar shroud	<b>ZV-BS-UL</b>
<b>Extension Terminal</b> 	Extension terminal—35 mm <sup>2</sup> (2–14 AWG)	<b>Z-EK/35/UL</b>
<b>Bus Connector</b> 	Bus connector—conductors up to 50 mm <sup>2</sup> (–1/0 AWG)	<b>Z-EB/50/UL</b>

#### Notes

- ① Voltage of FAZ-NA circuit breaker is limited to 300V with this auxiliary contact installed.
- ② Do not cut commoning link.
- ③ A maximum of three commoning links may be used in conjunction. Each breaker connected to the commoning link must have the same number of poles for proper use.
- ④ Not for use with ring-tongue circuit breakers.
- ⑤ Bus may be center fed for high current capacity.

# 1.2

## Miniature Circuit Breakers and Supplementary Protectors

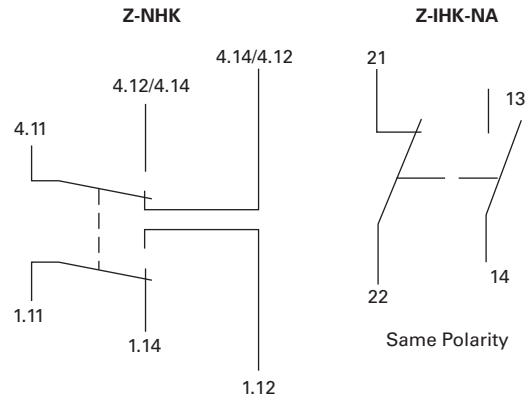
### UL 489 DIN Rail Miniature Circuit Breakers

1

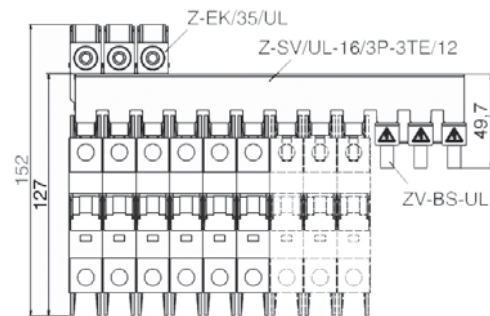
#### Tripping Signal Switch Z-NHK, Z-IHK-NA

- Design according to IEC/EN 60947-5-1, IEC/EN 62019
- Field installable
- The specified minimum voltages are per contact—take into account particularly in case of series connection
- Self-cleaning contacts
- Contact material and design particularly suitable for extra low voltage
- Z-NHK: the function of one of the two change-over contacts can be switched from “auxiliary switch” to “tripping signal switch”
- Tripping signal contact transmits message of electric tripping, not mechanical switch-off
- Test key for contact function “electrical tripping”
- Z-IHK-NA: will allow for > 480Y/277 Vac rating

#### Connection Diagram



#### Busbar Connection Example



### Technical Data and Specifications

#### Trip Curve Chart

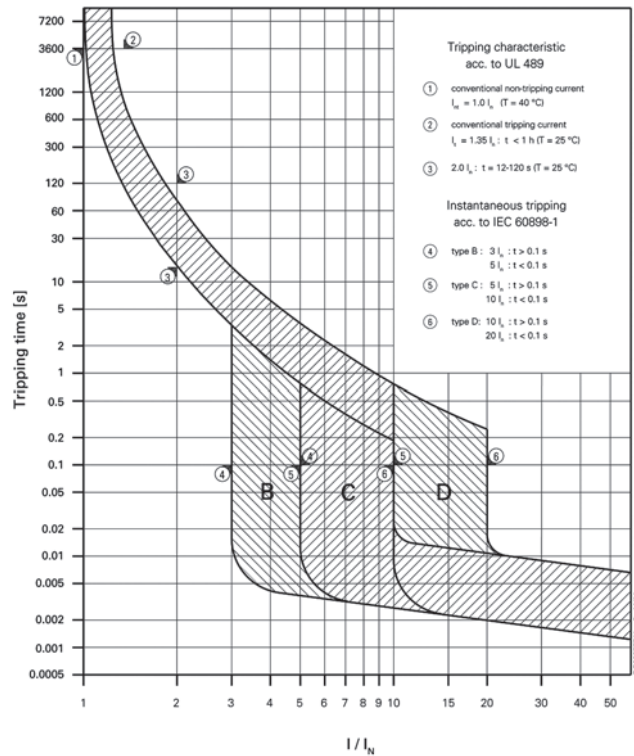
Eaton FAZ-NA branch circuit breakers are available with "B," "C" and "D" tripping characteristics. B-curve devices are suitable for applications where low levels of inrush current are expected.

C-curve devices are suitable for applications where medium levels of inrush current are expected. Applications include small transformers, lighting, pilot devices, control circuits and coils. C-curve devices provide a medium magnetic trip point.

D-curve devices are suitable for applications where high levels of inrush current are expected. The high magnetic trip point prevents nuisance tripping in high inductive applications such as motors, transformers and power supplies.

Eaton FAZ-NA devices are current limiting, which means they interrupt fault currents within one half cycle of the fault. Current limiting devices offer superior protection by reducing peak let-through current and energy.

#### Tripping Characteristics



# 1.2

## Miniature Circuit Breakers and Supplementary Protectors

### UL 489 DIN Rail Miniature Circuit Breakers

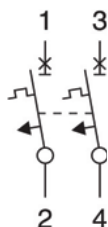
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#### Connection Diagrams

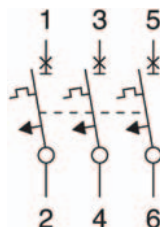
Single-Pole



Two-Pole



Three-Pole



#### Miniature Circuit Breakers FAZ-NA Technical Data

Description	Specification
<b>Electrical</b>	
Design according to	UL 489, CSA C22.2 No.5, IEC 60947-2
Rated voltage FAZ-NA UL/CSA	10 kAIC at 277/480V from 0.5A to 32A 14 kAIC at select amperages B and C Curves (15–25A), D Curve (13–20A)
UL/CSA	10 kAIC at 240 Vac for 35A and 40A
UL/CSA	10 kAIC at 48 Vdc per pole
IEC 947-2	15 kAIC at 240/415 Vac
Rated voltage FAZ-NA-DC UL/CSA	10 kAIC at 125 Vdc per pole (two poles maximum) 10 kAIC at 250 Vdc with two poles connected in series
Rated frequency	50/60 Hz
Characteristic	B, C, D
Endurance	≥ 20,000 operations
Line voltage connection	Suitable for reverse feed
<b>Mechanical</b>	
Frame size	45 mm
Device height	105 mm
Device width	17.7 mm per pole
Terminal protection	Finger and hand touch safe according to BGV A3, OVE-EN 6
Mounting	Quick fastening with two lock-in positions on IEC/EN 60715
Upper and lower terminals	Open mouth/lift terminals
Terminal capacity	One wire: AWG 18–6 Two wires: AWG 18–10
Terminal fastening torque	AWG 18–21: 21 lb-in AWG 10–8: 25 lb-in AWG 6: 36 lb-in
Mounting	Independent of position
Calibration temperature UL 489, CSA C22.2 No.5	40°C
IEC 60947-2	30°C

### Power Loss at $I_n$

$I_n$ [A]	Characteristic B			Characteristic C			Characteristic D		
	Single-Pole P [W]	Two-Pole P [W]	Three-Pole P [W]	Single-Pole P [W]	Two-Pole P [W]	Three-Pole P [W]	Single-Pole P [W]	Two-Pole P [W]	Three-Pole P [W]
0.5	—	—	—	1.6	3.2	4.7	1.6	3.2	4.8
1.0	1.1	2.2	3.4	1.1	2.2	3.4	0.8	1.5	2.3
1.5	2.2	4.4	6.6	1.3	2.6	3.9	1.0	2.1	3.1
2.0	1.4	2.8	4.3	1.4	2.8	4.3	1.0	2.1	3.1
3.0	2.1	4.2	6.4	1.2	2.4	3.6	1.2	2.4	3.6
4.0	1.4	2.9	4.3	1.4	2.9	4.3	1.4	2.9	4.3
5.0	1.8	3.7	5.5	1.9	3.7	5.6	1.5	2.9	4.4
6.0	1.7	3.5	5.2	1.2	2.3	3.5	1.2	2.3	3.5
7.0	2.0	4.0	6.0	1.4	2.8	4.3	1.4	2.8	4.3
8.0	2.0	3.9	5.9	1.4	2.8	4.2	1.2	2.4	3.7
10.0	1.8	3.6	5.3	1.8	3.6	5.3	1.5	3.0	4.5
13.0	2.4	4.7	7.1	2.4	4.7	7.1	2.0	4.1	6.1
15.0	1.9	3.8	5.6	1.9	3.8	5.6	1.5	3.1	4.6
16.0	2.1	4.3	6.4	2.1	4.3	6.4	1.7	3.5	5.2
20.0	2.9	5.8	8.7	2.9	5.8	8.7	1.8	3.7	5.5
25.0	3.1	6.2	9.3	3.1	6.2	9.3	2.6	5.1	7.7
30.0	3.0	6.0	9.0	3.0	6.0	9.0	2.7	5.4	8.1
32.0	3.4	6.8	10.2	3.4	6.8	10.2	3.1	6.2	9.3
35.0	4.0	8.1	12.1	3.7	7.4	11.0	3.8	7.6	11.3
40.0	4.0	8.1	12.1	4.0	8.1	12.1	3.9	7.8	11.6



# 1.2

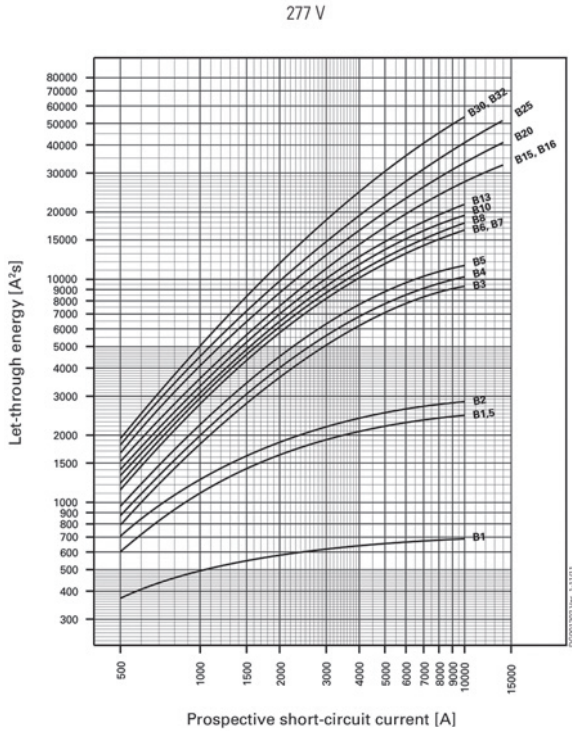
## Miniature Circuit Breakers and Supplementary Protectors

UL 489 DIN Rail Miniature Circuit Breakers

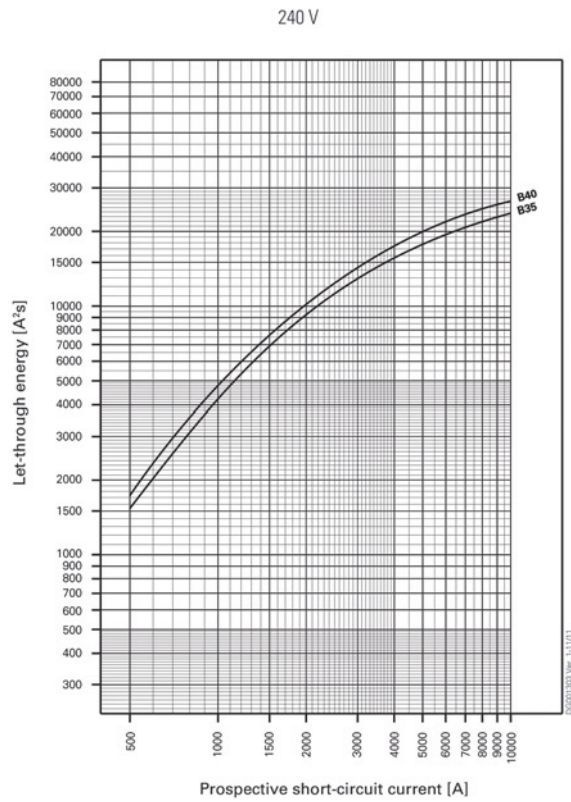
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### Let-Through Energy

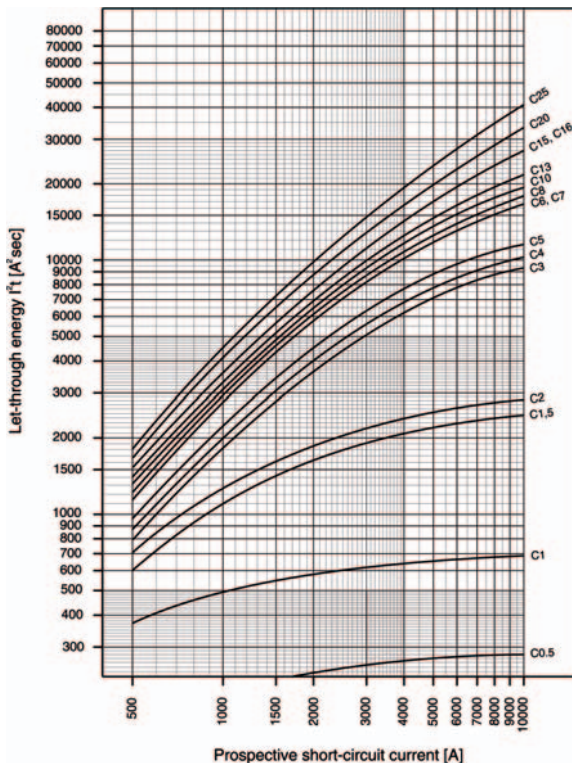
#### Characteristic B (1–32A), 277V



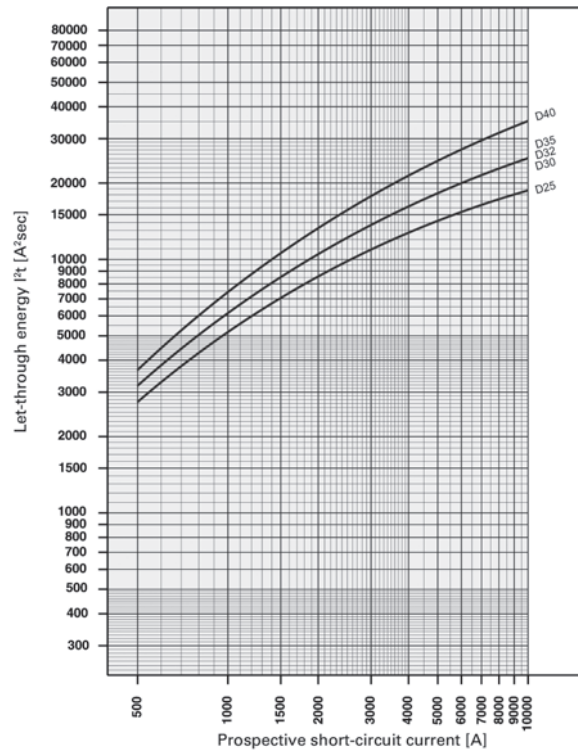
#### Characteristic B (35–40A), 240V



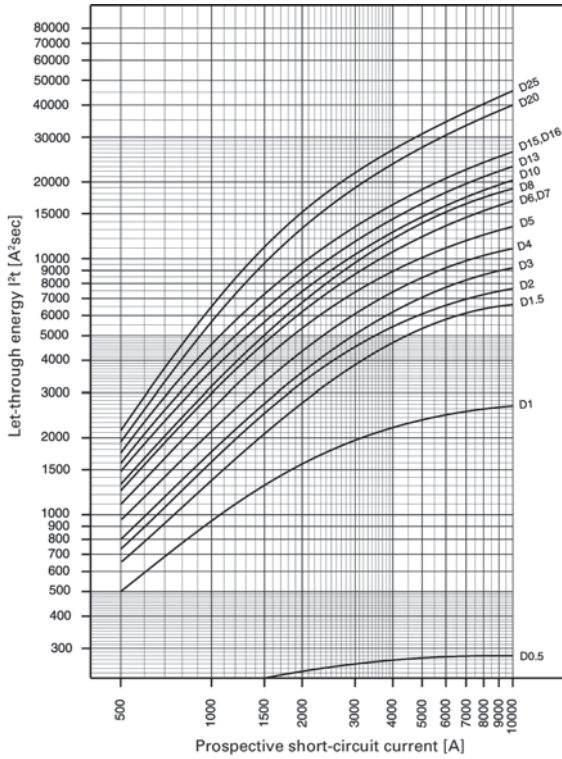
#### Characteristic C (0.5–32A), 277V



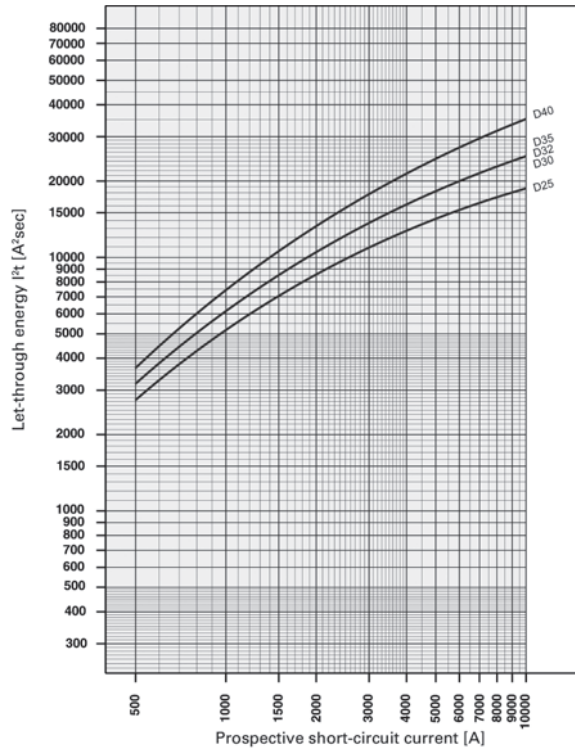
#### Characteristic C (40A), 240V



Characteristic D (0.5–32A), 277V



Characteristic D (40A), 240V



# 1.2

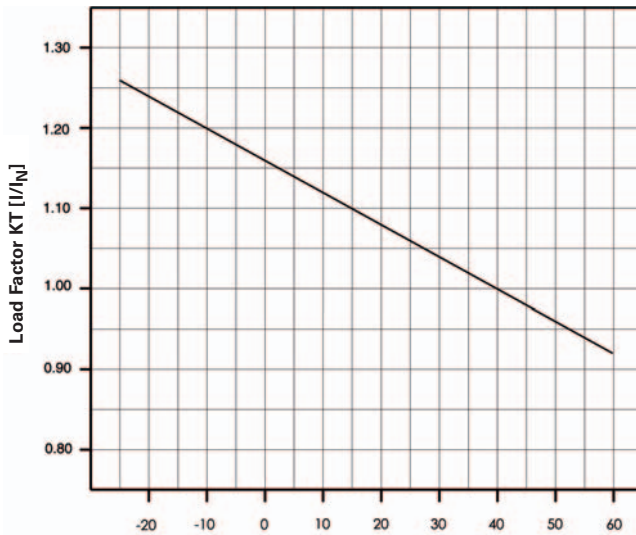
## Miniature Circuit Breakers and Supplementary Protectors

UL 489 DIN Rail Miniature Circuit Breakers

1

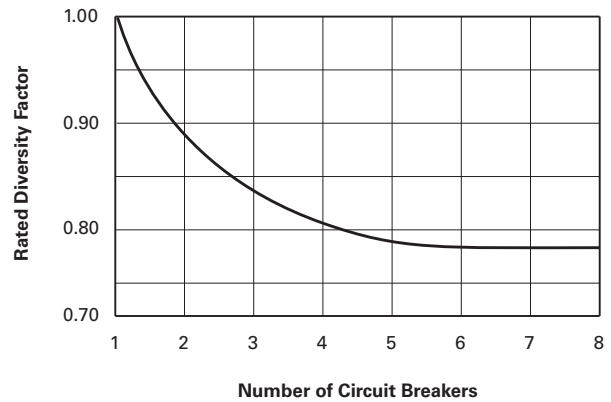
### Influence of Ambient Temperature T on Load Carrying Capacity

Device Market Current Rating $I_n$ (A) at 40°C	$I_n$ (A) at Higher Ambient Temperature							
	15°C	20°C	25°C	30°C	40°C	50°C	55°C	60°C
0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5
1.0	1.1	1.1	1.1	1.0	1.0	1.0	0.9	0.9
1.5	1.7	1.6	1.6	1.6	1.5	1.4	1.4	1.4
2.0	2.2	2.2	2.1	2.1	2.0	1.9	1.9	1.8
3.0	3.3	3.2	3.2	3.1	3.0	2.9	2.9	2.8
4.0	4.4	4.3	4.2	4.2	4.0	3.8	3.8	3.7
5.0	5.5	5.4	5.3	5.2	5.0	4.8	4.7	4.6
6.0	6.6	6.5	6.4	6.2	6.0	5.8	5.6	5.5
7.0	7.7	7.6	7.4	7.3	7.0	6.7	6.6	6.4
8.0	8.8	8.6	8.5	8.3	8.0	7.7	7.5	7.4
10.0	11.0	10.8	10.6	10.4	10.0	9.6	9.4	9.2
13.0	14.3	14.0	13.8	13.5	13.0	12.5	12.5	12.0
15.0	16.5	16.2	15.9	15.6	15.0	14.4	14.1	13.8
16.0	17.6	17.3	17.0	16.6	16.0	15.4	15.0	14.7
20.0	22.0	21.6	21.2	20.8	20.0	19.2	18.8	18.4
25.0	27.5	27.0	26.5	26.0	25.0	24.0	23.3	23.0
30.0	33.0	32.4	31.8	31.2	30.0	28.8	28.2	27.6
32.0	35.2	34.6	33.9	33.3	32.0	30.7	30.1	29.4
40.0	44.0	43.2	42.4	41.6	40.0	38.4	37.6	36.8



Maximum Load  $I_L$  at ambient temperature T:  $I_L(T) = I_N K_T(T)$

### Load Carrying Capacity of Adjoining Miniature Circuit Breakers



### Z-NHK

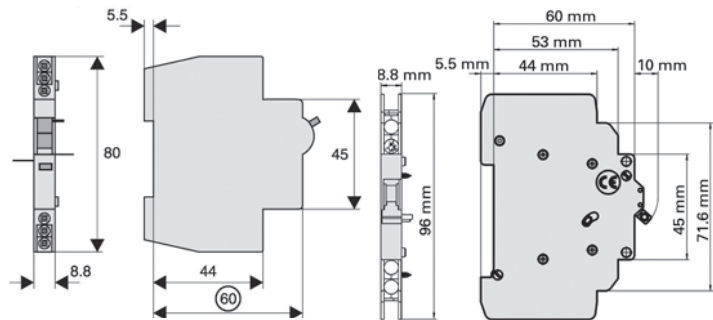


### Z-IHK-NA



### Contact and Auxiliary Contact

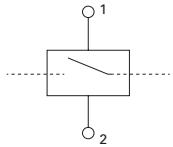
Description	Z-NHK	Z-IHK-NA
<b>Electrical</b>		
Contact function	2CO	1NO + 1NC
Rated voltage	230V	250V
Frequency	50/60 Hz	50/60 Hz
Rated current	2A	6A
Rated thermal current $I_{th}$	2A	6A
Utilization category AC13 Rated operational current $I_b$	3A/250 Vac	3A/250 Vac
Utilization category AC15 Rated operational current $I_b$	2A/250 Vac	2A/250 Vac
Utilization category DC12 Rated operational current $I_b$	0.5A/110 Vdc	0.5A/110 Vdc 0.25A/220 Vdc
Rated insulation voltage $U_i$	250 Vac	250 Vac
Minimum operational voltage per contact $U_{min}$	5 Vdc	5 Vdc
Minimum operational current $I_{min}$	10 mA DC	10 mA AC/DC
Rated peak withstand voltage $U_{imp}$ (1.2/50 $\mu$ )	2.5 kV	4 kV
Conditional short-circuit current $I_k$ with backup fuse 6A	1 kA	1 kA
Max. backup fuse, overload and short circuit	6A gL	—
<b>Mechanical</b>		
Tripping indicator "electrical tripping"	Blue/white	—
Frame size	45 mm	45 mm
Device height	80 mm	80 mm
Device width	8.8 mm (0.5MU)	8.8 mm (0.5MU)
Mounting	Onto switching device	—
Degree of protection, built-in	IP40	IP40
Terminal protection	Finger and hand touch safe According to BGV A3, ÖVE-EN 6	Finger and hand touch safe According to BGV A3, ÖVE-EN 6
Terminals	Lift terminals	Lift terminals
Terminal capacity	20–14 AWG	0.5–2.5 mm <sup>2</sup>
Terminal screws	M3 (Posidrive Z0)	M3 (Posidrive Z0)
Fastening torque of terminal screws	7 lb-in	Max. 1.2 Nm



#### Shunt trip release FAZ-XAA-NA

- Remote release for subsequent mounting onto FAZ-NA/RT
- Additional installation of standard auxiliary switch is possible
- Position indicator red–green

#### Connection Diagram



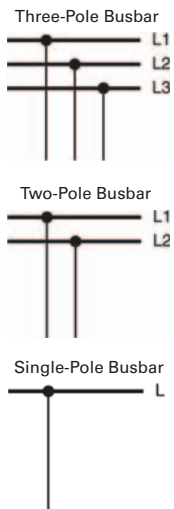
#### Shunt Trip Release FAZ-XAA-NA

Description	FAZ-XAA-NA12-110VAC	FAZ-XAA-NA110-415VAC
<b>Electrical</b>		
Can be mounted onto	FAZ-NA / FAZ-NA-DC / FAZ-RT	FAZ-NA / FAZ-NA-DC / FAZ-RT
Operational voltage range	12–110 Vac 12–60 Vdc	110–415 Vac 110–230 Vdc
Frequency	50/60 Hz	50/60 Hz
<b>Mechanical</b>		
Frame size	45 mm	45 mm
Device height	105 mm	105 mm
Device width	17.5 mm	17.5 mm
Mounting	Quick fastening with two lock-in positions on EN 50022	
Degree of protection, built-in	IP40	IP40
Terminal protection	Finger and hand touch safe according to BGV A3, ÖVE-EN 6	
Terminals	Open mouthed/lift	Open mouthed/lift
Terminal capacity One and two wires	18–10 AWG	18–10 AWG

#### Busbar block UL 489 (pin)

- Tested according to UL 489
- Do not cut
- Extension terminal 35 mm<sup>2</sup> Z-EK/35/UL for copper conductors
- Incoming terminal 50 mm<sup>2</sup> Z-EB/50/UL
- For covering of not used pins, use busbar tag shrouds ZV-BS-UL

#### Connection Diagrams

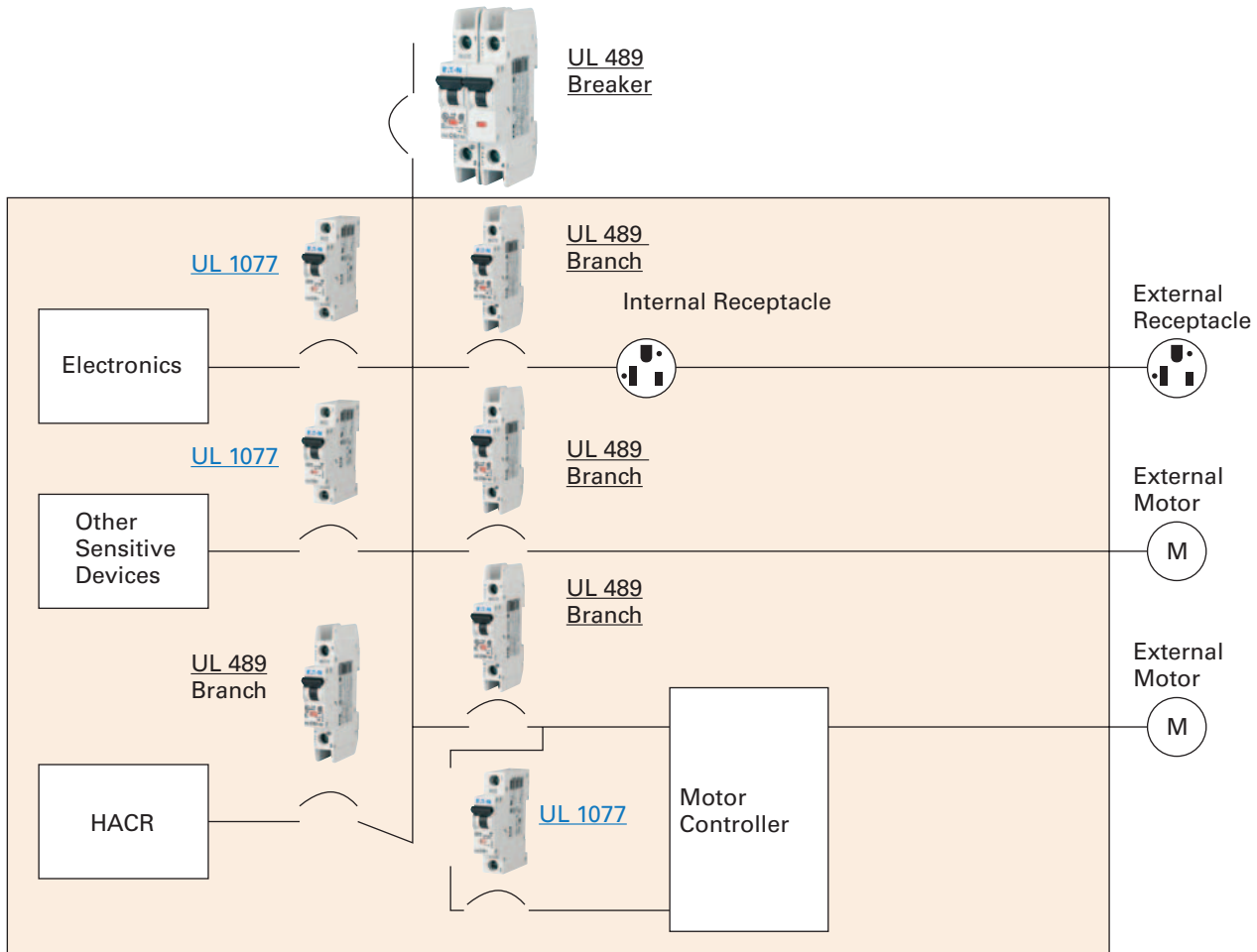


#### Busbar Block UL 489 (Pin)

Description	UL 489	IEC/EN 60947-2
<b>Electrical</b>		
Rated operational voltage	480/277 Vac 96 Vdc	—
Rated frequency	50/60 Hz	—
Rated voltage	480 Vac	690 Vac
Overvoltage category	—	III
Rated impulse withstand voltage U <sub>imp</sub>	—	9.5 kV
Rated current	80A at 40°C	80A at 30°C
Rated conditional short-circuit current AC with 350A gG	—	15 kA
Short-circuit current	10 kA	—
<b>Mechanical</b>		
Busbar cross section	—	16 mm <sup>2</sup> Cu
Flame class according to UL 94	V0	—
Pollution degree	—	2
Comparative tracking index	—	CTI 600
Minimum clearance (internal/external)	—	> 9.5/25.4 mm
Minimum creepage distance (internal/external)	—	> 12.7/50.8 mm
Resistance to climatic conditions	—	According to DIN/EN 60068

### Application Guidelines

#### Example of UL 489 and UL 1077 Application



Example of UL 489 and UL 1077 Application

#### UL 489 circuit breakers

Used for branch circuit protection, internal/external receptacles, external motors and HACR equipment (heating, air conditioning and refrigeration).

#### UL 1077 supplementary protectors

Used for overcurrent protection within appliances or electrical equipment, where branch circuit protection is already provided or not required.

**Note:** UL 489 devices can be used in place of UL 1077; UL 1077 devices cannot be used in place of UL 489.

# 1.2

## Miniature Circuit Breakers and Supplementary Protectors

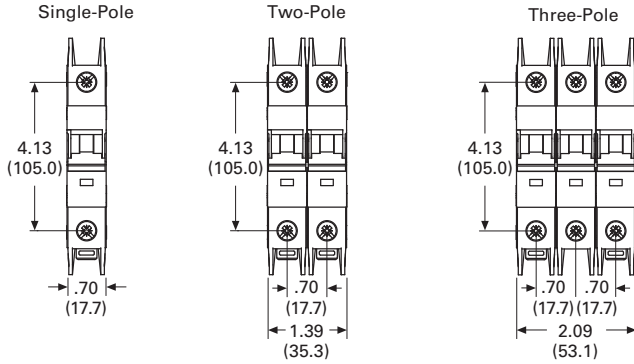
### UL 489 DIN Rail Miniature Circuit Breakers

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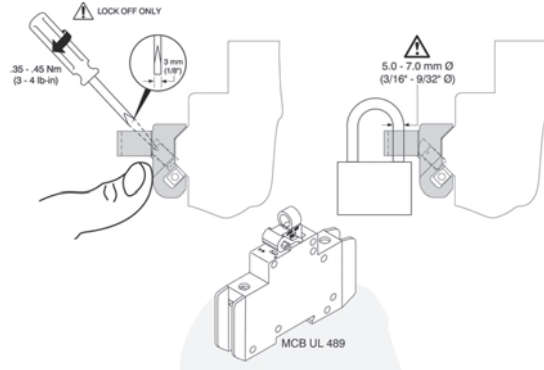
#### Dimensions

Approximate Dimensions in Inches (mm)

#### Miniature Circuit Breakers

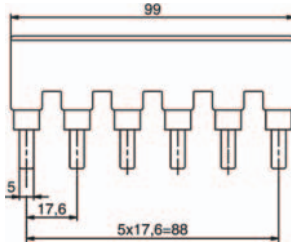


#### Lockout Attachment—IS/SPE-ITE

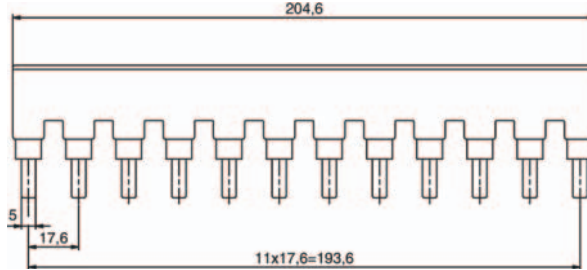


#### Accessories

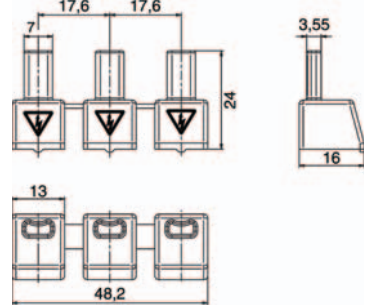
##### Z-SV/UL-16/6



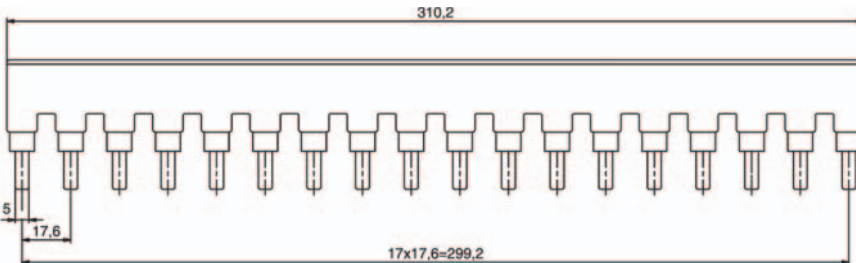
##### Z-SV/UL-18...12



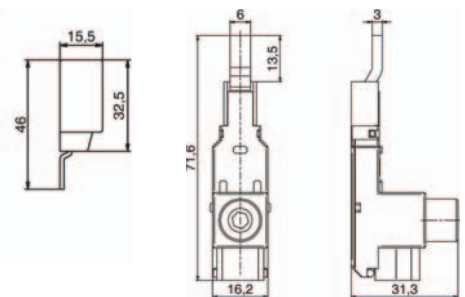
##### ZV-BS-UL



##### Z-SV/UL-16.../18



##### Z-EK/35/UL



#### Z-EK/35/UL

Description	UL 489	IEC/EN 60947-2
$U_e$	480 Vac/96 Vdc	240/415 Vac
$f$	50/60 Hz	50/60 Hz
$U_{imp}$	—	9.5 kV
$I_e$	80A at 40°C	80A at 30°C
	#2-14 AWG 60/75°C Cu	2.5-35 mm <sup>2</sup> Cu
	0.56 in	14 mm

#### Z-EB/50/UL

Description	UL 489	IEC/EN 60947-2
$U_e$	480 Vac/96 Vdc	240/415 Vac
$f$	50/60 Hz	50/60 Hz
$U_{imp}$	—	9.5 kV
$I_e$	115A at 40°C	160A at 30°C
	#1-14 AWG 60/75°C Cu	1.5-50 mm <sup>2</sup> Cu
	0.56 in	14 mm

### FAZ Circuit Breakers



*Optimum and Efficient Protection for Every Application*

### Contents

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Standards and Certifications . . . . .	<b>V4-T1-68</b>
Product Selection . . . . .	<b>V4-T1-69</b>
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Technical Data and Specifications . . . . .	<b>V4-T1-78</b>
Dimensions . . . . .	<b>V4-T1-85</b>

## FAZ Circuit Breakers

### Product Overview

Optimum product quality, tested reliability and safety stand for best protection of personnel, installations and plant. Eaton's FAZ DIN rail mountable circuit breaker is designed for use in control panel applications.

### Powerful offering for machine and system builders

The FAZ is available with B, C, D, K, S, and Z characteristics in accordance with UL 1077, CSA C22.2 No.235 and IEC 60947-2. These devices are CE marked.

### Application Description

- Supplementary protection
- Control circuits
- Lighting
- Business equipment
- Appliances

### Features

- Complete range of UL 1077 recognized DIN rail mounted miniature circuit breakers up to 63A current rating
- Standard ratings of 10 kAIC up to 277/480 Vac
- Current limiting design provides fast short-circuit interruption that reduces the let-through energy, which can damage the circuit
- Suitable for supplementary protection
- Thermal-magnetic overcurrent protection
  - Six levels of short-circuit protection, categorized by B, C, D, K, S, and Z curves
- Trip-free design—breaker can not be defeated by holding the handle in the ON position
- Captive screws cannot be lost
- Fulfill UL 1077, CSA C22.2 No.235 and also IEC 60947-2 Standard
- Field-installable shunt trip and auxiliary switch subsequent mounting
- Module width of only 17.7 mm (per pole)
- Contact position indicator (red/green)
- Easy installation on DIN rail
- Possibility for sealing the toggle in ON or OFF position



# 1.3

## Miniature Circuit Breakers and Supplementary Protectors

### UL 1077 DIN Rail Supplementary Protectors

1

#### Discover These Advanced Features

Breakers install on standard DIN rail

Available in one-, two-, three-, four-pole, 1+N and 3+N models

Color-coded indicator provides breaker status for easy troubleshooting



Captive Posidrive terminal screws with finger and back-of-hand protection (IP20)

Trip-free design; breaker cannot be defeated by holding the handle in the ON position

Breaker information printed on the front of the device for quick identification

#### Standards and Certifications

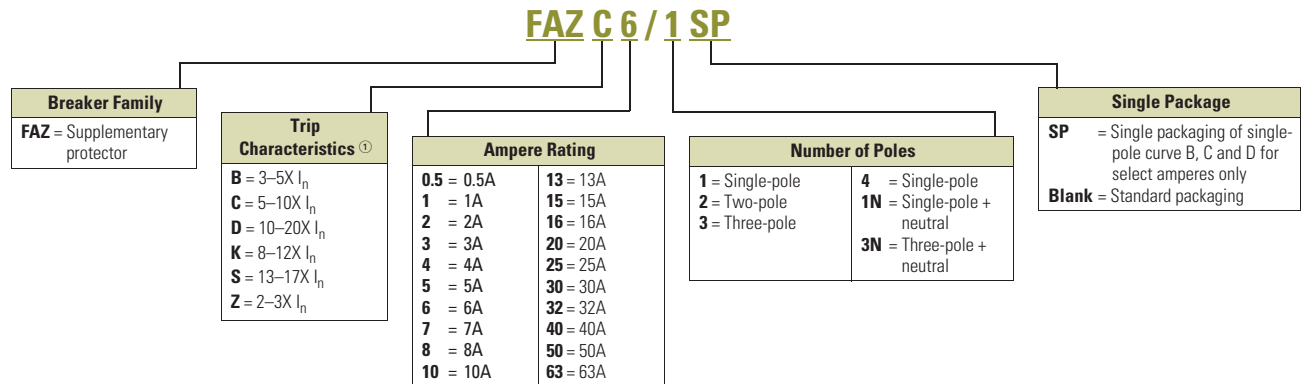
FAZ complies with the latest national and international standards.

- UL 1077, CSA C22.2 No. 235
- Apply to supplementary protectors intended for use as overcurrent, or overvoltage or undervoltage protection within an appliance or other electrical equipment where branch circuit protection is already provided, or is not required

- RoHS compliant
- VDE compliant
  - Devices with B, C, and D curves are VDE compliant
- CCC
  - Devices with B, C, and D curves are CCC compliant
- ABS compliant



#### Catalog Number Selection



#### Note

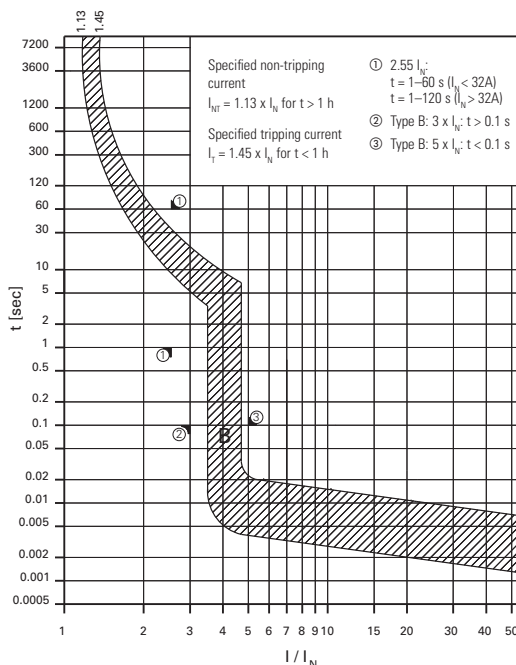
①  $I_n$  = Rated current for instantaneous trip characteristics.

### Product Selection

#### FAZ B curve (3–5X $I_n$ current rating)

- Designed for resistive or slightly inductive loads
- Response time of instantaneous trip: 3–5X  $I_n$  current rating
- UL recognized and CSA Certified as supplementary protectors
- For international and domestic use (conform to IEC 60947-2)
- UL file number 177451

Suitable for applications where protection against low-level short-circuit faults in control wiring is desired. Instantaneous trip is 3–5X continuous rating of device ( $I_n$ ). Applications include PLC wiring, business equipment, lighting, appliances and some motors. Low magnetic trip point.



#### Single-Pole



#### Two-Pole



#### Three-Pole



#### B Curve (3–5X $I_n$ Current Rating)— Designed for Resistive or Slightly Inductive Loads ①

Amperes	Single-Pole ② Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number
1	FAZ-B1/1-SP	FAZ-B1/2	FAZ-B1/3
2	FAZ-B2/1-SP	FAZ-B2/2	FAZ-B2/3
3	FAZ-B3/1-SP	FAZ-B3/2	FAZ-B3/3
4	FAZ-B4/1-SP	FAZ-B4/2	FAZ-B4/3
5	FAZ-B5/1-SP	FAZ-B5/2	FAZ-B5/3
6	FAZ-B6/1-SP	FAZ-B6/2	FAZ-B6/3
7	FAZ-B7/1-SP	FAZ-B7/2	FAZ-B7/3
8	FAZ-B8/1-SP	FAZ-B8/2	FAZ-B8/3
10	FAZ-B10/1-SP	FAZ-B10/2	FAZ-B10/3
12	FAZ-B12/1-SP	FAZ-B12/2	FAZ-B12/3
13	FAZ-B13/1-SP	FAZ-B13/2	FAZ-B13/3
15	FAZ-B15/1-SP	FAZ-B15/2	FAZ-B15/3
16	FAZ-B16/1-SP	FAZ-B16/2	FAZ-B16/3
20	FAZ-B20/1-SP	FAZ-B20/2	FAZ-B20/3
25	FAZ-B25/1-SP	FAZ-B25/2	FAZ-B25/3
30	FAZ-B30/1-SP	FAZ-B30/2	FAZ-B30/3
32	FAZ-B32/1-SP	FAZ-B32/2	FAZ-B32/3
40	FAZ-B40/1-SP	FAZ-B40/2	FAZ-B40/3
50	FAZ-B50/1-SP	FAZ-B50/2	FAZ-B50/3
63	FAZ-B63/1-SP	FAZ-B63/2	FAZ-B63/3

#### Four-Pole



#### Single-Pole + Neutral



#### Three-Pole + Neutral



#### B Curve (3–5X $I_n$ Current Rating)— Designed for Resistive or Slightly Inductive Loads, continued ①

Amperes	Four-Pole Catalog Number	Single-Pole + Neutral Catalog Number	Three-Pole + Neutral Catalog Number
1	FAZ-B1/4	FAZ-B1/1N	FAZ-B1/3N
2	FAZ-B2/4	FAZ-B2/1N	FAZ-B2/3N
3	FAZ-B3/4	FAZ-B3/1N	FAZ-B3/3N
4	FAZ-B4/4	FAZ-B4/1N	FAZ-B4/3N
5	FAZ-B5/4	FAZ-B5/1N	FAZ-B5/3N
6	FAZ-B6/4	FAZ-B6/1N	FAZ-B6/3N
7	FAZ-B7/4	FAZ-B7/1N	FAZ-B7/3N
8	FAZ-B8/4	FAZ-B8/1N	FAZ-B8/3N
10	FAZ-B10/4	FAZ-B10/1N	FAZ-B10/3N
12	FAZ-B12/4	FAZ-B12/1N	FAZ-B12/3N
13	FAZ-B13/4	FAZ-B13/1N	FAZ-B13/3N
15	FAZ-B15/4	FAZ-B15/1N	FAZ-B15/3N
16	FAZ-B16/4	FAZ-B16/1N	FAZ-B16/3N
20	FAZ-B20/4	FAZ-B20/1N	FAZ-B20/3N
25	FAZ-B25/4	FAZ-B25/1N	FAZ-B25/3N
30	FAZ-B30/4	FAZ-B30/1N	FAZ-B30/3N
32	FAZ-B32/4	FAZ-B32/1N	FAZ-B32/3N
40	FAZ-B40/4	FAZ-B40/1N	FAZ-B40/3N
50	FAZ-B50/4	FAZ-B50/1N	FAZ-B50/3N
63	FAZ-B63/4	FAZ-B63/1N	FAZ-B63/3N

#### Notes

- ① In North America, these switches are UL recognized and CSA Certified as supplementary protection devices. Per the intent of NEC (National Electrical Code), Article 240, and CEC (Canadian Electrical Code), Part 1 C22.1, supplementary breakers cannot be used as a substitute for the branch circuit protective device. They can be used to provide overcurrent protection within an appliance or other electrical equipment where branch circuit overcurrent protection is already provided, or is not required.
- ② Option for single packaging on single-pole B, C and D curves only; add suffix SP when ordering.

# 1.3

## Miniature Circuit Breakers and Supplementary Protectors

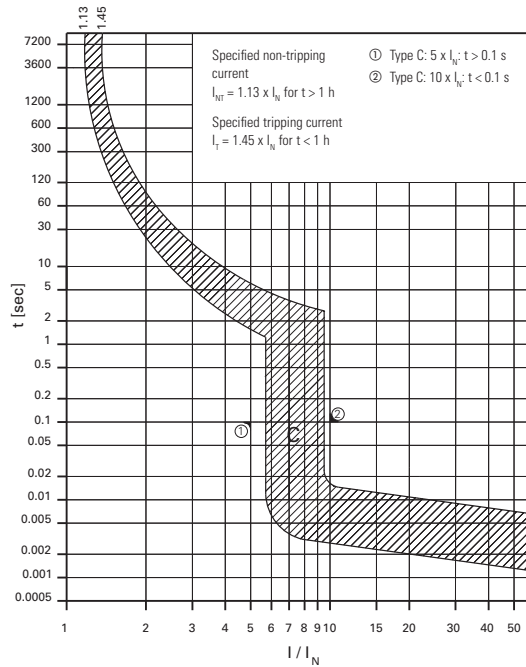
### UL 1077 DIN Rail Supplementary Protectors

1

#### FAZ C curve (5–10X $I_n$ current rating)

- Designed for inductive loads
- Response time of instantaneous trip: 5–10X  $I_n$  current rating
- UL recognized and CSA Certified as supplementary protectors
- For international and domestic use (conform to IEC 60947-2)
- UL file number 177451

Suitable for applications where medium levels of inrush current are expected. Instantaneous trip is 5–10X rating of device ( $I_n$ ). Applications include small transformers, lighting, pilot devices, control circuits and coils. Medium magnetic trip point.



#### Single-Pole



#### C Curve (5–10X $I_n$ Current Rating)— Designed Inductive Loads ①

Amperes	Single-Pole ② Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number
0.5	FAZ-C0.5/1-SP	FAZ-C0.5/2	FAZ-C0.5/3
1	FAZ-C1/1-SP	FAZ-C1/2	FAZ-C1/3
1.6	FAZ-C1.6/1-SP	FAZ-C1.6/2	FAZ-C1.6/3
2	FAZ-C2/1-SP	FAZ-C2/2	FAZ-C2/3
3	FAZ-C3/1-SP	FAZ-C3/2	FAZ-C3/3
4	FAZ-C4/1-SP	FAZ-C4/2	FAZ-C4/3
5	FAZ-C5/1-SP	FAZ-C5/2	FAZ-C5/3
6	FAZ-C6/1-SP	FAZ-C6/2	FAZ-C6/3
7	FAZ-C7/1-SP	FAZ-C7/2	FAZ-C7/3
8	FAZ-C8/1-SP	FAZ-C8/2	FAZ-C8/3
10	FAZ-C10/1-SP	FAZ-C10/2	FAZ-C10/3
13	FAZ-C13/1-SP	FAZ-C13/2	FAZ-C13/3
15	FAZ-C15/1-SP	FAZ-C15/2	FAZ-C15/3
16	FAZ-C16/1-SP	FAZ-C16/2	FAZ-C16/3
20	FAZ-C20/1-SP	FAZ-C20/2	FAZ-C20/3
25	FAZ-C25/1-SP	FAZ-C25/2	FAZ-C25/3
30	FAZ-C30/1-SP	FAZ-C30/2	FAZ-C30/3
32	FAZ-C32/1-SP	FAZ-C32/2	FAZ-C32/3
40	FAZ-C40/1-SP	FAZ-C40/2	FAZ-C40/3
50	FAZ-C50/1-SP	FAZ-C50/2	FAZ-C50/3
63	FAZ-C63/1-SP	FAZ-C63/2	FAZ-C63/3

#### Two-Pole



#### Three-Pole



#### Four-Pole



#### Single-Pole + Neutral



#### Three-Pole + Neutral



#### C Curve (5–10X $I_n$ Current Rating)— Designed Inductive Loads, continued ①

Amperes	Four-Pole Catalog Number	Single-Pole + Neutral Catalog Number	Three-Pole + Neutral Catalog Number
0.5	FAZ-C0.5/4	FAZ-C0.5/1N	FAZ-C0.5/3N
1	FAZ-C1/4	FAZ-C1/1N	FAZ-C1/3N
1.6	FAZ-C1.6/4	FAZ-C1.6/1N	FAZ-C1.6/3N
2	FAZ-C2/4	FAZ-C2/1N	FAZ-C2/3N
3	FAZ-C3/4	FAZ-C3/1N	FAZ-C3/3N
4	FAZ-C4/4	FAZ-C4/1N	FAZ-C4/3N
5	FAZ-C5/4	FAZ-C5/1N	FAZ-C5/3N
6	FAZ-C6/4	FAZ-C6/1N	FAZ-C6/3N
7	FAZ-C7/4	FAZ-C7/1N	FAZ-C7/3N
8	FAZ-C8/4	FAZ-C8/1N	FAZ-C8/3N
10	FAZ-C10/4	FAZ-C10/1N	FAZ-C10/3N
13	FAZ-C13/4	FAZ-C13/1N	FAZ-C13/3N
15	FAZ-C15/4	FAZ-C15/1N	FAZ-C15/3N
16	FAZ-C16/4	FAZ-C16/1N	FAZ-C16/3N
20	FAZ-C20/4	FAZ-C20/1N	FAZ-C20/3N
25	FAZ-C25/4	FAZ-C25/1N	FAZ-C25/3N
30	FAZ-C30/4	FAZ-C30/1N	FAZ-C30/3N
32	FAZ-C32/4	FAZ-C32/1N	FAZ-C32/3N
40	FAZ-C40/4	FAZ-C40/1N	FAZ-C40/3N
50	FAZ-C50/4	FAZ-C50/1N	FAZ-C50/3N
63	FAZ-C63/4	FAZ-C63/1N	FAZ-C63/3N

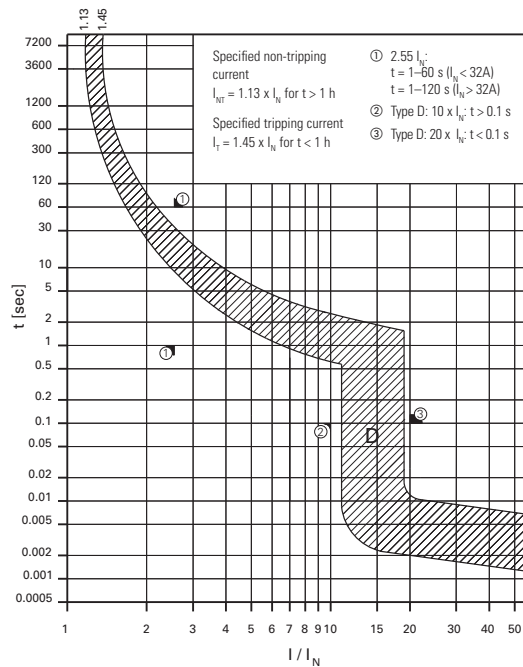
#### Notes

- ① In North America, these switches are UL recognized and CSA Certified as supplementary protection devices. Per the intent of NEC (National Electrical Code), Article 240, and CEC (Canadian Electrical Code), Part 1 C22.1, supplementary breakers cannot be used as a substitute for the branch circuit protective device. They can be used to provide overcurrent protection within an appliance or other electrical equipment where branch circuit overcurrent protection is already provided, or is not required.
- ② Option for single packaging on single-pole B, C and D curves only; add suffix SP when ordering.

### FAZ D curve (10–20X $I_n$ current rating)

- Designed for highly inductive loads
- Response time of instantaneous trip: 10–20X  $I_n$  current rating
- UL recognized and CSA Certified as supplementary protectors
- For international and domestic use (conform to IEC 60947-2)
- UL file number 177451

Suitable for applications where high levels of inrush current are expected. Instantaneous trip is 10–20X rating of device ( $I_n$ ). The high magnetic trip point prevents nuisance tripping in high inductive applications such as motors, transformers and power supplies.



### Single-Pole



### Two-Pole



### Three-Pole



### D Curve (10–20X $I_n$ Current Rating)— Designed for Inductive Loads ①

Amperes	Single-Pole ② Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number
0.5	FAZ-D0.5/1-SP	FAZ-D0.5/2	FAZ-D0.5/3
1	FAZ-D1/1-SP	FAZ-D1/2	FAZ-D1/3
2	FAZ-D2/1-SP	FAZ-D2/2	FAZ-D2/3
3	FAZ-D3/1-SP	FAZ-D3/2	FAZ-D3/3
4	FAZ-D4/1-SP	FAZ-D4/2	FAZ-D4/3
5	FAZ-D5/1-SP	FAZ-D5/2	FAZ-D5/3
6	FAZ-D6/1-SP	FAZ-D6/2	FAZ-D6/3
7	FAZ-D7/1-SP	FAZ-D7/2	FAZ-D7/3
8	FAZ-D8/1-SP	FAZ-D8/2	FAZ-D8/3
10	FAZ-D10/1-SP	FAZ-D10/2	FAZ-D10/3
13	FAZ-D13/1-SP	FAZ-D13/2	FAZ-D13/3
15	FAZ-D15/1-SP	FAZ-D15/2	FAZ-D15/3
16	FAZ-D16/1-SP	FAZ-D16/2	FAZ-D16/3
20	FAZ-D20/1-SP	FAZ-D20/2	FAZ-D20/3
25	FAZ-D25/1-SP	FAZ-D25/2	FAZ-D25/3
30	FAZ-D30/1-SP	FAZ-D30/2	FAZ-D30/3
32	FAZ-D32/1-SP	FAZ-D32/2	FAZ-D32/3
40	FAZ-D40/1-SP	FAZ-D40/2	FAZ-D40/3
50 ③	FAZ-D50/1-SP	FAZ-D50/2	FAZ-D50/3
63 ③	FAZ-D63/1-SP	FAZ-D63/2	FAZ-D63/3

### Four-Pole



### Single-Pole + Neutral



### Three-Pole + Neutral



### D Curve (10–20X $I_n$ Current Rating)— Designed for Inductive Loads, continued ①

Amperes	Four-Pole Catalog Number	Single-Pole + Neutral Catalog Number	Three-Pole + Neutral Catalog Number
0.5	FAZ-D0.5/4	FAZ-D0.5/1N	FAZ-D0.5/3N
1	FAZ-D1/4	FAZ-D1/1N	FAZ-D1/3N
2	FAZ-D2/4	FAZ-D2/1N	FAZ-D2/3N
3	FAZ-D3/4	FAZ-D3/1N	FAZ-D3/3N
4	FAZ-D4/4	FAZ-D4/1N	FAZ-D4/3N
5	FAZ-D5/4	FAZ-D5/1N	FAZ-D5/3N
6	FAZ-D6/4	FAZ-D6/1N	FAZ-D6/3N
7	FAZ-D7/4	FAZ-D7/1N	FAZ-D7/3N
8	FAZ-D8/4	FAZ-D8/1N	FAZ-D8/3N
10	FAZ-D10/4	FAZ-D10/1N	FAZ-D10/3N
13	FAZ-D13/4	FAZ-D13/1N	FAZ-D13/3N
15	FAZ-D15/4	FAZ-D15/1N	FAZ-D15/3N
16	FAZ-D16/4	FAZ-D16/1N	FAZ-D16/3N
20	FAZ-D20/4	FAZ-D20/1N	FAZ-D20/3N
25	FAZ-D25/4	FAZ-D25/1N	FAZ-D25/3N
30	FAZ-D30/4	FAZ-D30/1N	FAZ-D30/3N
32	FAZ-D32/4	FAZ-D32/1N	FAZ-D32/3N
40	FAZ-D40/4	FAZ-D40/1N	FAZ-D40/3N
50 ③	FAZ-D50/4	FAZ-D50/1N	FAZ-D50/3N
63 ③	FAZ-D63/4	FAZ-D63/1N	FAZ-D63/3N

#### Notes

- ① In North America, these switches are UL recognized and CSA Certified as supplementary protection devices. Per the intent of NEC (National Electrical Code), Article 240, and CEC (Canadian Electrical Code), Part 1 C22.1, supplementary breakers cannot be used as a substitute for the branch circuit protective device. They can be used to provide overcurrent protection within an appliance or other electrical equipment where branch circuit overcurrent protection is already provided, or is not required.
- ② Option for single packaging on single-pole B, C and D curves only; add suffix SP when ordering.
- ③ IEC 60947-2 only.

# 1.3

## Miniature Circuit Breakers and Supplementary Protectors

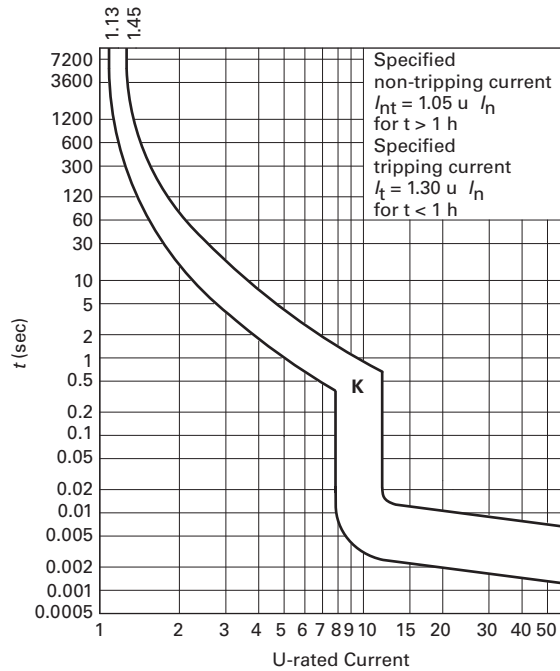
### UL 1077 DIN Rail Supplementary Protectors

1

#### FAZ K curve (8–12X $I_n$ current rating)

- Designed for motors, transformers and upstream electronics
- Response time of instantaneous trip: 8–12X  $I_n$  current rating
- UL recognized and CSA Certified as supplementary protectors
- For international and domestic use (conform to IEC 60947-2)
- UL file number 177451

Suitable for applications where medium levels of inrush current are expected. Instantaneous trip is 8–12X rating of device ( $I_n$ ). Applications include small transformers, lighting, pilot devices, control circuits and coils. Medium magnetic trip point.



#### Single-Pole



#### K Curve (8–12X $I_n$ Current Rating) — Designed for Inductive Loads <sup>①②</sup>

Amperes	Single-Pole <sup>③</sup> Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number
0.5	FAZ-K0.5/1	FAZ-K0.5/2	FAZ-K0.5/3
1	FAZ-K1/1	FAZ-K1/2	FAZ-K1/3
1.6	FAZ-K1.6/1	FAZ-K1.6/2	FAZ-K1.6/3
2	FAZ-K2/1	FAZ-K2/2	FAZ-K2/3
3	FAZ-K3/1	FAZ-K3/2	FAZ-K3/3
4	FAZ-K4/1	FAZ-K4/2	FAZ-K4/3
6	FAZ-K6/1	FAZ-K6/2	FAZ-K6/3
8	FAZ-K8/1	FAZ-K8/2	FAZ-K8/3
10	FAZ-K10/1	FAZ-K10/2	FAZ-K10/3
13	FAZ-K13/1	FAZ-K13/2	FAZ-K13/3
16	FAZ-K16/1	FAZ-K16/2	FAZ-K16/3
20	FAZ-K20/1	FAZ-K20/2	FAZ-K20/3
25	FAZ-K25/1	FAZ-K25/2	FAZ-K25/3
32	FAZ-K32/1	FAZ-K32/2	FAZ-K32/3
40	FAZ-K40/1	FAZ-K40/2	FAZ-K40/3
50	FAZ-K50/1	FAZ-K50/2	FAZ-K50/3
63	FAZ-K63/1	FAZ-K63/2	FAZ-K63/3

#### Two-Pole



#### Three-Pole



#### Four-Pole



#### Single-Pole + Neutral



#### Three-Pole + Neutral



#### K Curve (8–12X $I_n$ Current Rating) — Designed for Inductive Loads, continued <sup>①②</sup>

Amperes	Four-Pole <sup>③</sup> Catalog Number	Single-Pole + Neutral Catalog Number	Three-Pole + Neutral Catalog Number
0.5	FAZ-K0.5/4	FAZ-K0.5/1N	FAZ-K0.5/3N
1	FAZ-K1/4	FAZ-K1/1N	FAZ-K1/3N
1.6	FAZ-K1.6/4	FAZ-K1.6/1N	FAZ-K1.6/3N
2	FAZ-K2/4	FAZ-K2/1N	FAZ-K2/3N
3	FAZ-K3/4	FAZ-K3/1N	FAZ-K3/3N
4	FAZ-K4/4	FAZ-K4/1N	FAZ-K4/3N
6	FAZ-K6/4	FAZ-K6/1N	FAZ-K6/3N
8	FAZ-K8/4	FAZ-K8/1N	FAZ-K8/3N
10	FAZ-K10/4	FAZ-K10/1N	FAZ-K10/3N
13	FAZ-K13/4	FAZ-K13/1N	FAZ-K13/3N
16	FAZ-K16/4	FAZ-K16/1N	FAZ-K16/3N
20	FAZ-K20/4	FAZ-K20/1N	FAZ-K20/3N
25	FAZ-K25/4	FAZ-K25/1N	FAZ-K25/3N
32	FAZ-K32/4	FAZ-K32/1N	FAZ-K32/3N
40	FAZ-K40/4	FAZ-K40/1N	FAZ-K40/3N
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63	FAZ-K63/4	FAZ-K63/1N	FAZ-K63/3N

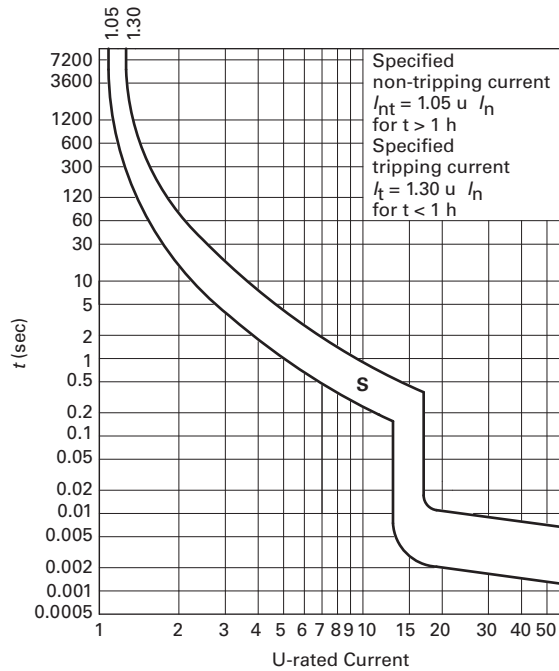
#### Notes

- ① In North America, these switches are UL recognized and CSA Certified as supplementary protection devices. Per the intent of NEC (National Electrical Code), Article 240, and CEC (Canadian Electrical Code), Part 1 C22.1, supplementary breakers cannot be used as a substitute for the branch circuit protective device. They can be used to provide overcurrent protection within an appliance or other electrical equipment where branch circuit overcurrent protection is already provided, or is not required.
- ② These breakers are available by special order and may result in additional delivery time.
- ③ Two-piece box order, quantities of 2.

### FAZ S curve (13–17X $I_n$ current rating)

- Designed for control circuits with high inrush
- Response time of instantaneous trip: 13–17X  $I_n$  current rating
- UL recognized and CSA Certified as supplementary protectors
- For international and domestic use (conform to IEC 60947-2)
- UL file number 177451

Suitable for applications where high levels of inrush current are expected. Instantaneous trip is 13–17X rating of device ( $I_n$ ). The high magnetic trip point prevents nuisance tripping in high inductive applications such as motors, transformers and power supplies.



### Single-Pole



### Two-Pole



### S Curve (13–17X $I_n$ Current Rating)— Designed for Inductive Loads ①②

Amperes	Single-Pole ③	Two-Pole
	Catalog Number	Catalog Number
1	FAZ-S1/1	FAZ-S1/2
2	FAZ-S2/1	FAZ-S2/2
3	FAZ-S3/1	FAZ-S3/2
4	FAZ-S4/1	FAZ-S4/2
6	FAZ-S6/1	FAZ-S6/2
10	FAZ-S10/1	FAZ-S10/2
16	FAZ-S16/1	FAZ-S16/2
20	FAZ-S20/1	FAZ-S20/2
25	FAZ-S25/1	FAZ-S25/2
32	FAZ-S32/1	FAZ-S32/2
40	FAZ-S40/1	FAZ-S40/2

### Notes

- ① In North America, these switches are UL recognized and CSA Certified as supplementary protection devices. Per the intent of NEC (National Electrical Code), Article 240, and CEC (Canadian Electrical Code), Part 1 C22.1, supplementary breakers cannot be used as a substitute for the branch circuit protective device. They can be used to provide overcurrent protection within an appliance or other electrical equipment where branch circuit overcurrent protection is already provided, or is not required.
- ② These breakers are available by special order and may result in additional delivery time.
- ③ Two-piece box order, quantities of 2.

# 1.3

## Miniature Circuit Breakers and Supplementary Protectors

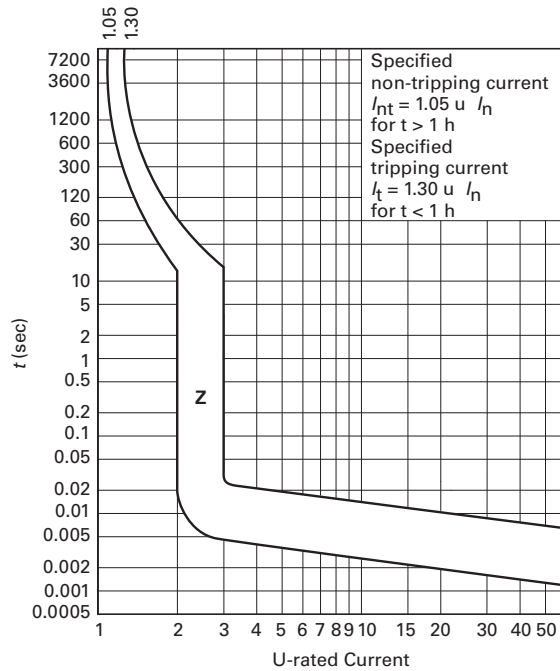
### UL 1077 DIN Rail Supplementary Protectors

1

#### FAZ Z curve (2–3X $I_n$ current rating)

- Designed for protection of electronic devices
- Response time of instantaneous trip: 2–3X  $I_n$  current rating
- UL recognized and CSA Certified as supplementary protectors
- For international and domestic use (conform to IEC 60947-2)

Suitable for applications where low levels of inrush current are expected. Instantaneous trip is 2–3X rating of device ( $I_n$ ). Applications include small transformers, lighting, pilot devices, control circuits and coils. Medium magnetic trip point.



#### Single-Pole



#### Z Curve (2–3X $I_n$ Current Rating)—Designed for Inductive Loads ①②

Amperes	Single-Pole ③ Catalog Number	Two-Pole Catalog Number
0.5	FAZ-Z0.5/1	FAZ-Z0.5/2
1	FAZ-Z1/1	FAZ-Z1/2
1.6	FAZ-Z1.6/1	FAZ-Z1.6/2
2	FAZ-Z2/1	FAZ-Z2/2
3	FAZ-Z3/1	FAZ-Z3/2
4	FAZ-Z4/1	FAZ-Z4/2
6	FAZ-Z6/1	FAZ-Z6/2
8	FAZ-Z8/1	FAZ-Z8/2
10	FAZ-Z10/1	FAZ-Z10/2
13	FAZ-Z13/1	FAZ-Z13/2
16	FAZ-Z16/1	FAZ-Z16/2
20	FAZ-Z20/1	FAZ-Z20/2
25	FAZ-Z25/1	FAZ-Z25/2
32	FAZ-Z32/1	FAZ-Z32/2
40	FAZ-Z40/1	FAZ-Z40/2
50	FAZ-Z50/1	FAZ-Z50/2
63	FAZ-Z63/1	FAZ-Z63/2

#### Two-Pole



#### Three-Pole



#### Z Curve (2–3X $I_n$ Current Rating)—Designed for Inductive Loads, continued ①②

Amperes	Three-Pole Catalog Number	Four-Pole Catalog Number
0.5	FAZ-Z0.5/3	FAZ-Z0.5/4
1	FAZ-Z1/3	FAZ-Z1/4
1.6	FAZ-Z1.6/3	FAZ-Z1.6/4
2	FAZ-Z2/3	FAZ-Z2/4
3	FAZ-Z3/3	FAZ-Z3/4
4	FAZ-Z4/3	FAZ-Z4/4
6	FAZ-Z6/3	FAZ-Z6/4
8	FAZ-Z8/3	FAZ-Z8/4
10	FAZ-Z10/3	FAZ-Z10/4
13	FAZ-Z13/3	FAZ-Z13/4
16	FAZ-Z16/3	FAZ-Z16/4
20	FAZ-Z20/3	FAZ-Z20/4
25	FAZ-Z25/3	FAZ-Z25/4
32	FAZ-Z32/3	FAZ-Z32/4
40	FAZ-Z40/3	FAZ-Z40/4
50	FAZ-Z50/3	FAZ-Z50/4
63	FAZ-Z63/3	FAZ-Z63/4

#### Four-Pole


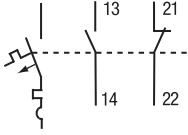


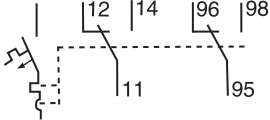
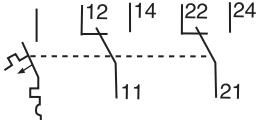






#### Notes

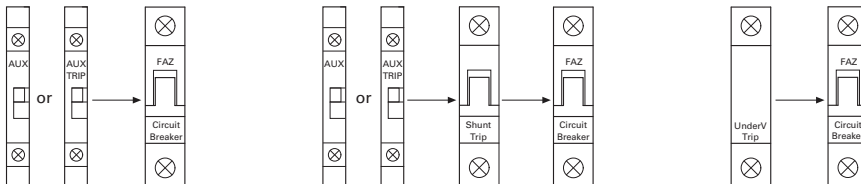
- ① In North America, these switches are UL recognized and CSA Certified as supplementary protection devices. Per the intent of NEC (National Electrical Code), Article 240, and CEC (Canadian Electrical Code), Part 1 C22.1, supplementary breakers cannot be used as a substitute for the branch circuit protective device. They can be used to provide overcurrent protection within an appliance or other electrical equipment where branch circuit overcurrent protection is already provided, or is not required.
- ② These breakers are available by special order and may result in additional delivery time.
- ③ Two-piece box order, quantities of 2.

### Accessories

#### FAZ Auxiliary Contacts and Voltage Trips

	Circuit Diagram	Description	Rated Operational Voltage	Catalog Number
<b>Standard Auxiliary Contacts</b>				
		<ul style="list-style-type: none"> <li>1NO/1NC</li> <li>Installs on left side of FAZ or shunt trip</li> <li>Max. one per FAZ (1077) device</li> <li>Switches when FAZ is tripped electrically or manually</li> </ul>	230 Vac	<b>FAZ-XHIN11</b>
		<ul style="list-style-type: none"> <li>1 changeover contact</li> <li>Installs on left side of FAZ or shunt trip</li> <li>Max. one per FAZ (1077) device</li> <li>Switches when FAZ is tripped electrically or manually</li> </ul>	230 Vac	<b>FAZ-XHINW1</b>
<b>Auxiliary/Trip Indicating Contact</b>				
		<ul style="list-style-type: none"> <li>Small selector screw changes mode</li> <li>Two Form C (changeover) contacts</li> <li>Installs on left side of FAZ or shunt trip</li> <li>Auxiliary contacts switch when FAZ is tripped electrically or manually</li> <li>Trip indicating contact switches only when FAZ is tripped electrically</li> </ul>	230 Vac	<b>FAZ-XAM002</b>
		<p>Two-pole auxiliary mode</p> <p>Trip indicating mode</p>		
<b>Undervoltage Trip</b>				
		<ul style="list-style-type: none"> <li>Prevents FAZ from operating unless voltage is present</li> </ul>	115 Vac	<b>FAZ-XUA(115VAC)</b>
		<ul style="list-style-type: none"> <li>Installs on left side of FAZ</li> </ul>	230 Vac	<b>FAZ-XUA(230VAC)</b>
		<ul style="list-style-type: none"> <li>Includes test button</li> </ul>	400 Vac	<b>FAZ-XUA(400VAC)</b>
<b>Shunt Trip</b>				
		<ul style="list-style-type: none"> <li>Allows remote trip of FAZ</li> </ul>	12–110 Vac	<b>FAZ-XAA-C-12-110VAC</b>
		<ul style="list-style-type: none"> <li>Installs on left side of FAZ</li> </ul>	12–60 Vdc	
			110–415 Vac	<b>FAZ-XAA-C-110-415VAC</b>
			110–230 Vdc	

#### Allowable Combinations of Accessories





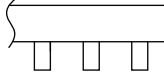
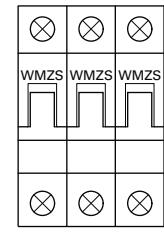
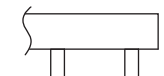
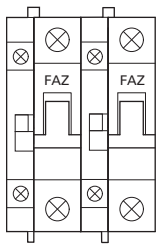
# 1.3

## Miniature Circuit Breakers and Supplementary Protectors

### UL 1077 DIN Rail Supplementary Protectors

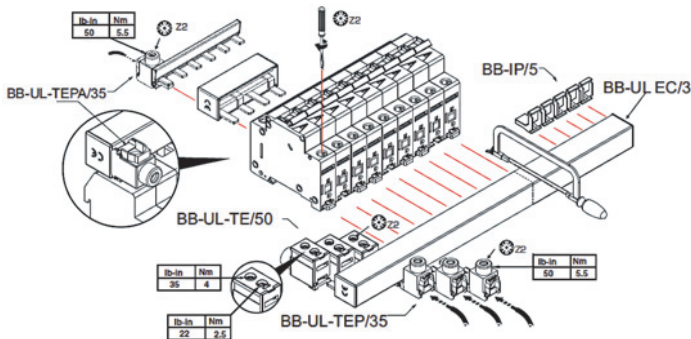
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#### Busbar System

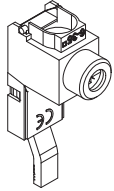
Description	Rated Operational Current	Number of Poles per Device	Number of Terminals	Catalog Number <sup>①</sup>
<b>Without Auxiliary Contacts</b>				
For connecting FAZ supplementary protectors without auxiliary contacts. May be fed from line or load side.	80A	1	57	<b>BB-UL-18/1P-1M/57</b>
		2	56	<b>BB-UL-18/2P-2M/56</b>
		3	57	<b>BB-UL-18/3P-3M/57</b>
	100A	1	57	<b>BB-UL-25/1P-1M/57</b>
		2	56	<b>BB-UL-25/2P-2M/56</b>
		3	57	<b>BB-UL-25/3P-3M/57</b>
<b>Auxiliary/Trip Indicating Contacts</b>				
For connecting FAZ supplementary protectors with auxiliary contacts. May be fed from line or load side.	80A	1	37	<b>BB-UL-18/1P-1,5M/37</b>
		2	46	<b>BB-UL-18/2P+AS-2,5M/46</b>
		3	48	<b>BB-UL-18/3P+AS-3,5M/48</b>
	100A	1	37	<b>BB-UL-25/1P-1,5M/37</b>
		2	46	<b>BB-UL-25/2P+AS-2,5M/46</b>
		3	48	<b>BB-UL-25/3P+AS-3,5M/48</b>

**Note**

① Bus may be center fed for high current capacity.



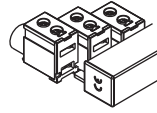
### Incoming Terminal



### Pin Type Incoming Supply Terminals

Description	Catalog Number
<ul style="list-style-type: none"> <li>Accommodates conductors from 6–35 mm<sup>2</sup>/#10–2 AWG</li> <li>4–5.5 Nm/35–50 lb-in</li> <li>Two- and three-pole</li> </ul>	<b>BB-UL-TEP/35</b>

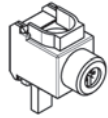
### Incoming Terminal



### Bus Incoming Supply Terminals

Description	Catalog Number
<ul style="list-style-type: none"> <li>50 mm<sup>2</sup></li> <li>#14–1 AWG</li> <li>75 Deg wire</li> <li>115 A/Y, 480V UL</li> <li>160 A/Y 690V IEC</li> </ul>	<b>BB-UL-TE/50</b>

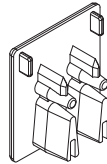
### Incoming Terminal



### Pin Type Incoming Supply Terminals—Single-Phase Only

Description	Catalog Number
<ul style="list-style-type: none"> <li>Accommodates conductors from 6–35 mm<sup>2</sup>/#10–2 AWG</li> <li>4–5.5 Nm/35–50 lb-in</li> </ul>	<b>BB-UL-TEPA/35</b>

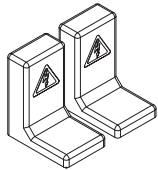
### Fork Connector



### Busbar End Cap

Description	Poles	Catalog Number
<ul style="list-style-type: none"> <li>Install after cutting busbar</li> </ul>	2 and 3	<b>BB-UL-EC/3</b>
<ul style="list-style-type: none"> <li>Protects end of busbar</li> </ul>	1	<b>BB-UL-EC/1</b>

### Busbar Terminal Cover

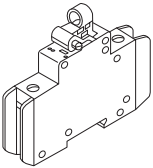


### Protective Accessories

Description	Catalog Number
For covering unused terminals	<b>BB-IP/5</b>
<ul style="list-style-type: none"> <li>Prevents reactivation of the device during maintenance</li> <li>Holds one padlock</li> </ul>	<b>IS/SPE-1TE</b>



### Padlock Hasp



#### 1

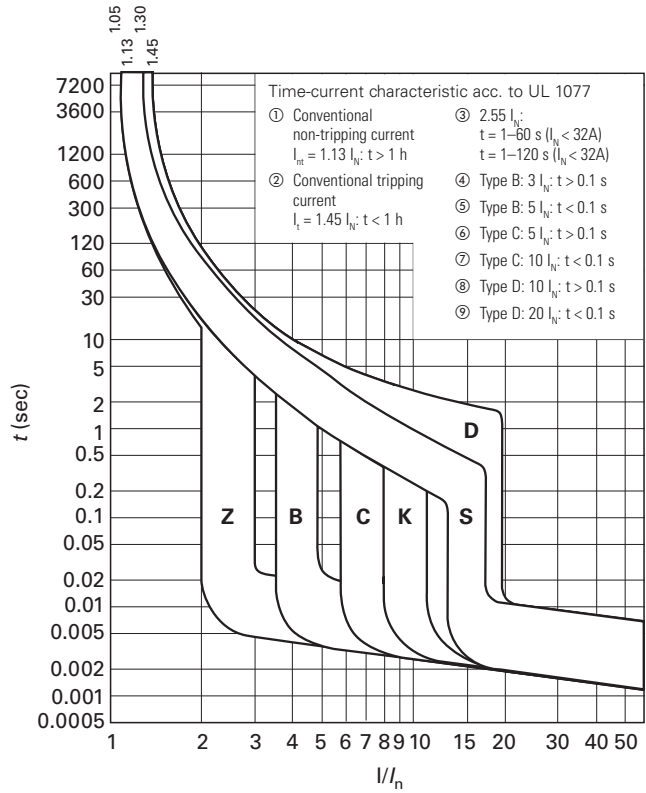
#### Technical Data and Specifications

##### Trip Curves Chart

Eaton FAZ supplementary protectors are available with six different tripping characteristics, including Type B, C, D, K, S and Z. Definitions for each trip curve are contained on the ordering pages and can be used to determine the optimal characteristic for your application. For example, low-level short-circuit faults in control wiring, such as PLCs, are best protected by devices with Type B trip characteristics (3–5X continuous rating of the device  $I_n$ ).

Even though not required by NEC or CEC for supplementary protectors, Eaton's FAZ devices are current limiting, which means that they interrupt fault currents within one half cycle. Current limiting devices offer superior protection by reducing peak let-through current and energy.

##### Tripping Characteristics



### FAZ Miniature Circuit Breakers Technical Data

Description	B Curve	C Curve	D Curve
<b>Electrical</b>			
Approvals	UR (UL 1077), CSA (CSA 22.2 No. 235), CE		
Standards	IEC/EN 60947-2		
Short-circuit trip response	3–5 $I_n$	5–10 $I_n$	10–20 $I_n$
<b>Supplementary Protectors—UL/CSA</b>			
Current range	1–63A	0.5–63A	0.5–40A
Maximum voltage ratings—UL/CSA			
Single-pole, single-pole + neutral	277 Vac 48 Vdc	277 Vac 48 Vdc	277 Vac 48 Vdc
Two-, three-pole, four-pole and three-pole + neutral	480Y/277 Vac	480Y/277 Vac	480Y/277 Vac
Two poles in series	96 Vdc	96 Vdc	96 Vdc
Thermal tripping characteristics			
Single-pole	1.35 x $I_n$ @ 40°C	1.35 x $I_n$ @ 40°C	1.35 x $I_n$ @ 40°C
Multi-pole	1.45 x $I_n$ @ 40°C	1.45 x $I_n$ @ 40°C	1.45 x $I_n$ @ 40°C
Short-circuit ratings (at max. voltage)			
Single-pole	10 kA (5 kA for 40–63A device)	10 kA (5 kA for 40–63A device)	5 kA
Two-, three-pole	10 kA (5 kA for 40–63A device)	10 kA (5 kA for 40–63A device)	5 kA
Single-pole	10 kA @ 48 Vdc	10 kA @ 48 Vdc	10 kA @ 48 Vdc
Two poles in series	10 kA @ 96 Vdc	10 kA @ 96 Vdc	10 kA @ 96 Vdc
<b>Miniature Circuit Breaker—IEC</b>			
Current range	1–63A	0.5–63A	0.5–63A
Maximum voltage ratings—IEC 68898-1			
Single-pole	230 Vac	230 Vac	230 Vac
Two-, three-pole	230/400 Vac	230/400 Vac	230/400 Vac
Maximum voltage ratings—IEC 60947-2			
Single-pole	240 Vac 48 Vdc	240 Vac 48 Vdc	240 Vac 48 Vdc
Two-, three-pole	240/415 Vac	240/415 Vac	240/415 Vac
Two poles in series	96 Vdc	96 Vdc	96 Vdc
Thermal tripping characteristics			
Single-pole	> 1 hour @ 1.05 x $I_n$	> 1 hour @ 1.05 x $I_n$	> 1 hour @ 1.05 x $I_n$
Multi-pole	< 1 hour @ 1.3 x $I_n$	< 1 hour @ 1.3 x $I_n$	< 1 hour @ 1.3 x $I_n$
Interrupt ratings (at max. voltage)			
IEC 60947-2	15 kA	15 kA	15 kA (10 kA for 50 and 63A)
IEC 60898	10 kA	10 kA	10 kA (50 and 63A not available)
Operational switching capacity	7.5 kA	7.5 kA	7.5 kA
Max. backup fuse [gL/gG]	125A	125A	125A
Rated impulse withstand— $U_{imp}$	4000 Vac	4000 Vac	4000 Vac
Rated insulation voltage— $U_i$	440 Vac	440 Vac	440 Vac
<b>Environmental/General</b>			
Selectivity class	3	3	3
Lifespan (operations)	> 10,000 (1 operation = ON/OFF)	> 10,000 (1 operation = ON/OFF)	> 10,000 (1 operation = ON/OFF)
Shock (IEC 68-2-22)	10g–120 ms	10g–120 ms	10g–120 ms
Operating temperature range	–40 to +167°F (–40 to +75°C)	–40 to +167°F (–40 to +75°C)	–40 to +167°F (–40 to +75°C)
Shipment and short-term storage	–40 to +185°F (–40 to +85°C)	–40 to +185°F (–40 to +85°C)	–40 to +185°F (–40 to +85°C)
Housing material	Nylon	Nylon	Nylon
<b>Mechanical</b>			
Standard front dimension			
Device height	80 mm	80 mm	80 mm
Terminal protection	Finger and back-of-hand proof to IEC 536	Finger and back-of-hand proof to IEC 536	Finger and back-of-hand proof to IEC 536
Mounting width per pole	17.5 mm	17.5 mm	17.5 mm
Mounting	IEC/EN 60715 top-hat rail	IEC/EN 60715 top-hat rail	IEC/EN 60715 top-hat rail
Degree of protection	IP20	IP20	IP20
Terminals top and bottom	Twin-purpose terminals	Twin-purpose terminals	Twin-purpose terminals
Supply connection	Line or load side	Line or load side	Line or load side
Terminal capacity [mm <sup>2</sup> ]	1 x 25 (AWG 4–18)/2 x 10 (AWG 8–18)	1 x 25 (AWG 4–18)/2 x 10 (AWG 8–18)	1 x 25 (AWG 4–18)/2 x 10 (AWG 8–18)
Torque	2.4 Nm	2.4 Nm	2.4 Nm
Imperial torque	21 lb-in (AWG 18–12), 25 lb-in (AWG 10–8), 36 lb-in (AWG 6–4)	21 lb-in (AWG 18–12), 25 lb-in (AWG 10–8), 36 lb-in (AWG 6–4)	21 lb-in (AWG 18–12), 25 lb-in (AWG 10–8), 36 lb-in (AWG 6–4)
Thickness of busbar material	0.8–2 mm	0.8–2 mm	0.8–2 mm
Mounting position	As required	As required	As required

# 1.3

## Miniature Circuit Breakers and Supplementary Protectors

### UL 1077 DIN Rail Supplementary Protectors

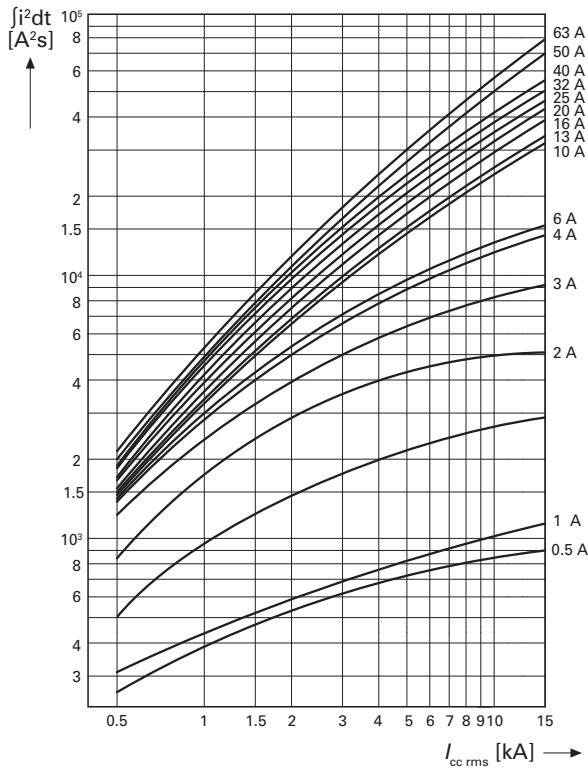
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#### FAZ Miniature Circuit Breakers Technical Data, continued

Description	B Curve	C Curve	D Curve
<b>Electrical</b>			
Approvals	UR (UL 1077), CSA (CSA 22.2 No. 235), CE		
Standards	IEC/EN 60947-2, E177451, 204453		
Short-circuit trip response	8–12 $I_n$	13–17 $I_n$	2–3 $I_n$
<b>Supplementary Protectors—UL/CSA</b>			
Current range	0.5–63A	0.5–40A	1–63A
Maximum voltage ratings—UL/CSA			
Single-pole, single-pole + neutral	277 Vac 48 Vdc	277 Vac 48 Vdc	277 Vac 48 Vdc
Two-, three-, four-pole and three-pole + neutral	480Y/277 Vac	480Y/277 Vac	480Y/277 Vac
Two poles in series	96 Vdc	96 Vdc	96 Vdc
Thermal tripping characteristics			
Single-pole	1.35 x $I_n$ @ 40°C	1.35 x $I_n$ @ 40°C	1.35 x $I_n$ @ 40°C
Multi-pole	1.45 x $I_n$ @ 40°C	1.45 x $I_n$ @ 40°C	1.45 x $I_n$ @ 40°C
Short-circuit ratings (at max. voltage)			
Single-pole	5 kA @ 277 Vac	5 kA @ 277 Vac	5 kA @ 277 Vac
Single-pole + neutral	5 kA @ 277 Vac	5 kA @ 277 Vac	5 kA @ 277 Vac
Two-, three-, four-pole	5 kA @ 480Y/277 Vac	5 kA @ 480Y/277 Vac	5 kA @ 480Y/277 Vac
Two poles in series	—	—	—
<b>Miniature Circuit Breaker—IEC</b>			
Current range	0.5–63A	0.5–40A	1–63A
Maximum voltage ratings—IEC 60947-2			
Single-pole, single-pole + neutral	240 Vac	240 Vac	240 Vac
Two-, three-, four-pole, three-pole + neutral	240/415 Vac	240/415 Vac	240/415 Vac
Thermal tripping characteristics			
Single-pole	> 1 Hour @ 1.05 x $I_n$	> 1 Hour @ 1.05 x $I_n$	> 1 Hour @ 1.05 x $I_n$
Multi-pole	< 1 Hour @ 1.3 x $I_n$	< 1 Hour @ 1.3 x $I_n$	< 1 Hour @ 1.3 x $I_n$
Interrupt ratings (at max. voltage)			
IEC 60947-2	15 kA	10 kA	10 kA
Operational switching capacity	7.5 kA	7.5 kA	7.5 kA
Max. backup fuse [gL/gG]	125A	125A	125A
Rated impulse withstand— $U_{imp}$	4000 Vac	4000 Vac	4000 Vac
Rated insulation voltage— $U_i$	440 Vac	440 Vac	440 Vac
<b>Environmental/General</b>			
Selectivity class	3	3	3
Lifespan (operations)	> 10,000 (1 operation = ON/OFF)	> 10,000 (1 operation = ON/OFF)	> 10,000 (1 operation = ON/OFF)
Shock (IEC 68-2-22)	10g–120 ms	10g–120 ms	10g–120 ms
Operating temperature range	–40 to +167°F (–40 to +75°C)	–40 to +167°F (–40 to +75°C)	–40 to +167°F (–40 to +75°C)
Shipment and short-term storage	–40 to +185°F (–40 to +85°C)	–40 to +185°F (–40 to +85°C)	–40 to +185°F (–40 to +85°C)
Housing material	Nylon	Nylon	Nylon
<b>Mechanical</b>			
Standard front dimension			
Device height	80 mm	80 mm	80 mm
Terminal protection	Finger and back-of-hand proof to IEC 536	Finger and back-of-hand proof to IEC 536	Finger and back-of-hand proof to IEC 536
Mounting width per pole	17.7 mm	17.7 mm	17.7 mm
Mounting	IEC/EN 60715 top-hat rail	IEC/EN 60715 top-hat rail	IEC/EN 60715 top-hat rail
Degree of protection	IP20	IP20	IP20
Terminals top and bottom	Twin-purpose terminals	Twin-purpose terminals	Twin-purpose terminals
Supply connection	Line or load side	Line or load side	Line or load side
Terminal capacity [mm <sup>2</sup> ]	1 x 25 (AWG 4–18) / 2 x 10 (AWG 8–18)	1 x 25 (AWG 4–18) / 2 x 10 (AWG 8–18)	1 x 25 (AWG 4–18) / 2 x 10 (AWG 8–18)
Torque	2.4 Nm	2.4 Nm	2.4 Nm
Imperial torque	21 lb-in (AWG 18–12), 25 lb-in (AWG 10–8), 36 lb-in (AWG 6–4)	21 lb-in (AWG 18–12), 25 lb-in (AWG 10–8), 36 lb-in (AWG 6–4)	21 lb-in (AWG 18–12), 25 lb-in (AWG 10–8), 36 lb-in (AWG 6–4)
Thickness of busbar material	0.8–2 mm	0.8–2 mm	0.8–2 mm
Mounting position	As required	As required	As required

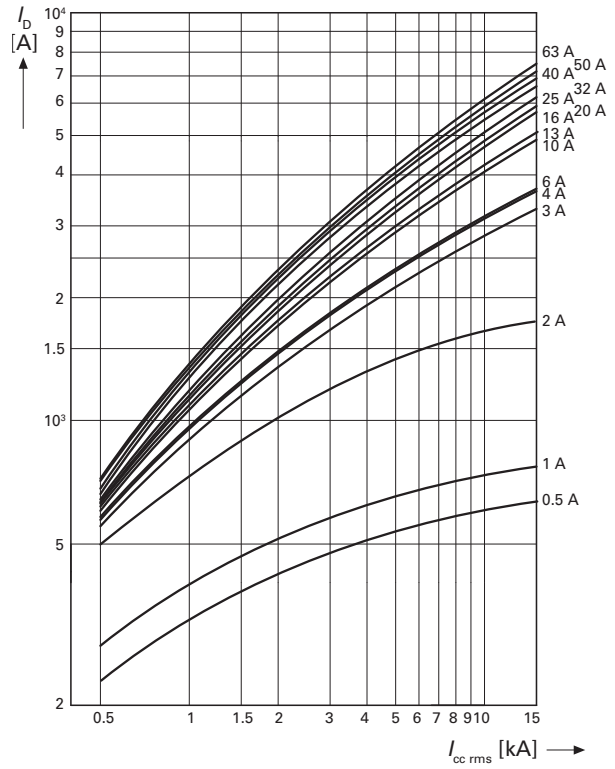
### Let-Through Energy $I^2t$

#### Characteristic B and C

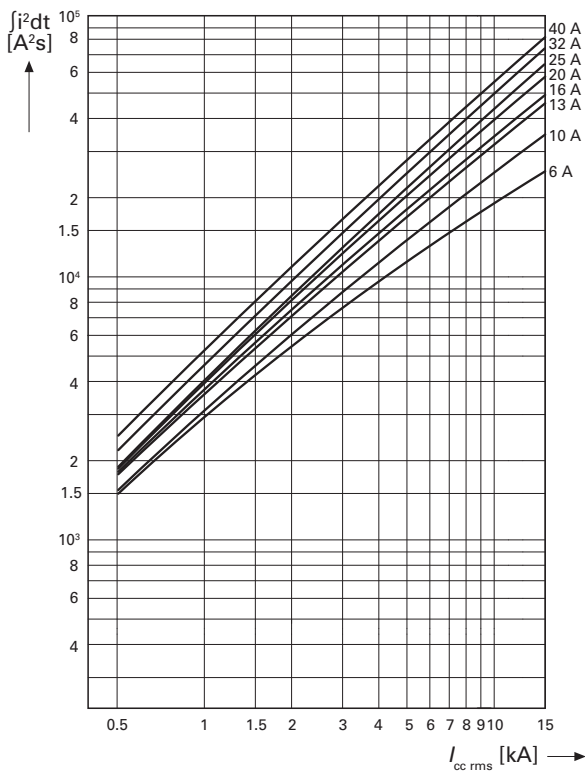


### Let-Through Energy $I_D$

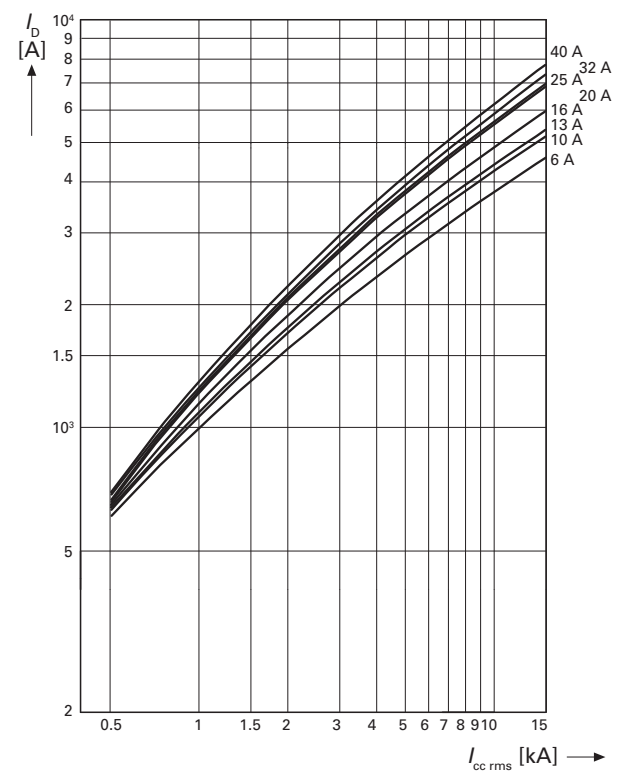
#### Characteristic B and C



### Characteristic D



### Characteristic D



# 1.3

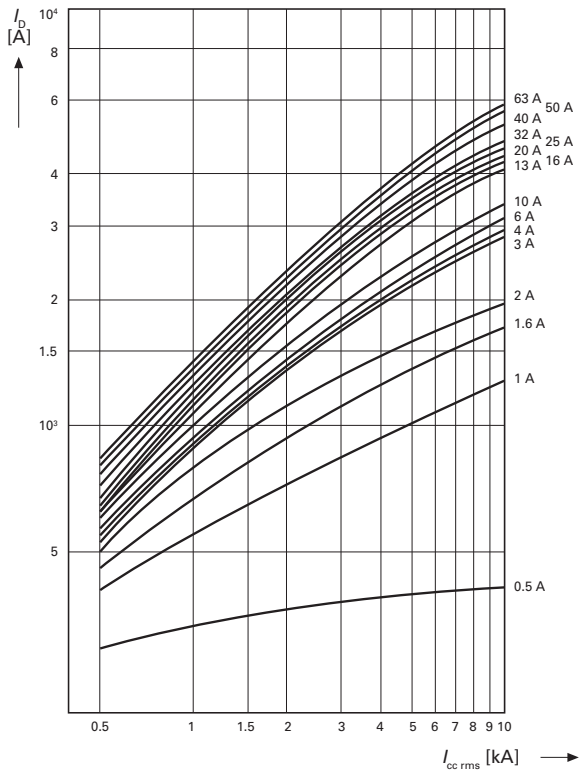
## Miniature Circuit Breakers and Supplementary Protectors

UL 1077 DIN Rail Supplementary Protectors

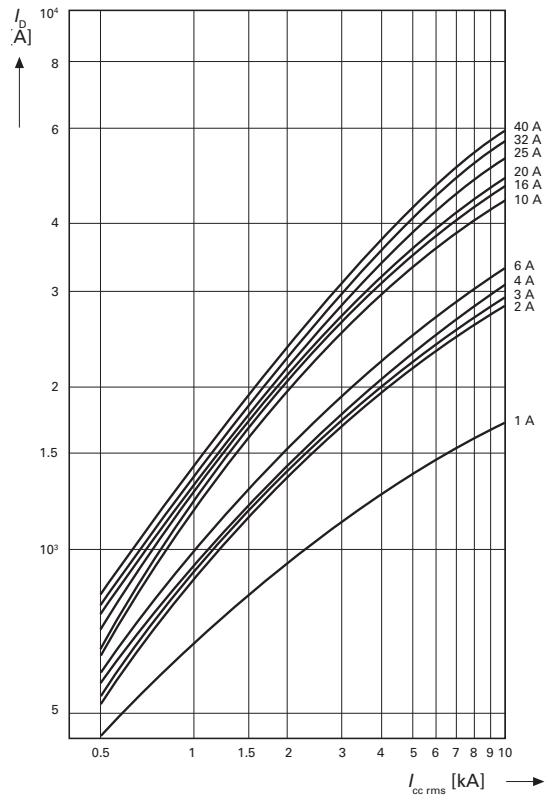
1

### Let-Through Energy $I^2t$

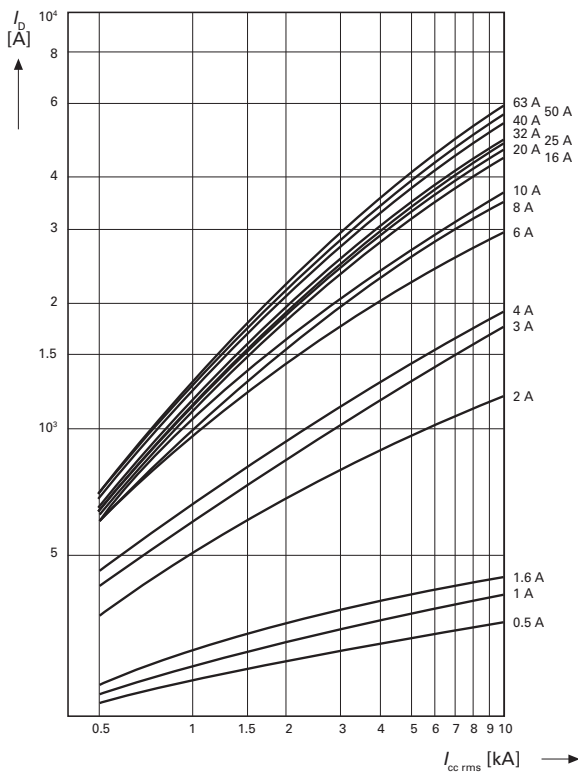
Characteristic K



Characteristic S



Characteristic Z



### Influence of the Ambient Temperature on the Thermal Tripping Behavior

Corrected values of the rated current dependent on the ambient temperature

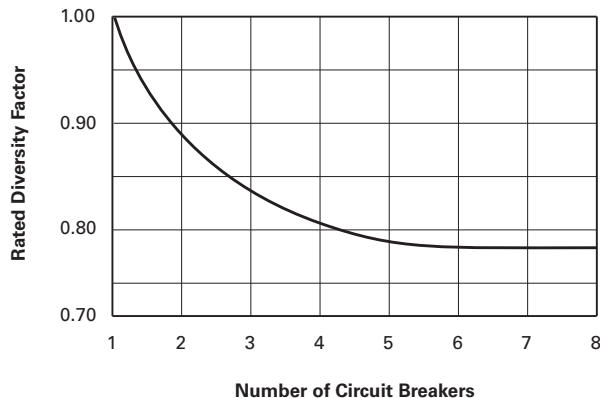
$I_n$ (A)	Ambient Temperature T																
	-40°C	-30°C	-20°C	-10°C	0°C	10°C	20°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C	65°C	70°C	75°C
0.16	0.20	0.20	0.19	0.19	0.18	0.17	0.17	0.16	0.16	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.13
0.25	0.32	0.31	0.30	0.29	0.28	0.27	0.26	0.25	0.25	0.24	0.24	0.23	0.23	0.22	0.22	0.21	0.21
0.50	0.64	0.62	0.60	0.58	0.56	0.54	0.52	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41
0.75	0.96	0.93	0.90	0.87	0.84	0.81	0.78	0.75	0.74	0.73	0.71	0.69	0.68	0.66	0.65	0.64	0.62
1.00	1.30	1.20	1.20	1.20	1.10	1.10	1.00	1.00	0.99	0.97	0.95	0.93	0.90	0.89	0.87	0.85	0.83
1.50	1.90	1.90	1.80	1.70	1.70	1.60	1.60	1.50	1.50	1.50	1.40	1.40	1.40	1.30	1.30	1.30	1.20
1.60	2.00	2.00	1.90	1.90	1.80	1.70	1.70	1.60	1.60	1.50	1.50	1.50	1.40	1.40	1.40	1.40	1.30
2.00	2.60	2.50	2.40	2.30	2.20	2.20	2.10	2.00	2.00	1.90	1.90	1.90	1.80	1.80	1.70	1.70	1.70
2.50	3.20	3.10	3.00	2.90	2.80	2.70	2.60	2.50	2.50	2.40	2.40	2.30	2.30	2.20	2.20	2.10	2.10
3.00	3.80	3.70	3.60	3.50	3.40	3.30	3.10	3.00	3.00	2.90	2.80	2.80	2.70	2.70	2.60	2.50	2.50
3.50	4.50	4.40	4.20	4.10	3.90	3.80	3.70	3.50	3.40	3.40	3.30	3.20	3.20	3.10	3.00	3.00	2.90
4.00	5.10	5.00	4.80	4.70	4.50	4.30	4.20	4.00	3.90	3.90	3.80	3.70	3.60	3.50	3.50	3.40	3.30
5.00	6.40	6.20	6.00	5.80	5.60	5.40	5.20	5.00	4.90	4.80	4.70	4.60	4.50	4.40	4.30	4.20	4.10
6.00	7.70	7.50	7.20	7.00	6.70	6.50	6.30	6.00	5.90	5.80	5.70	5.60	5.40	5.30	5.20	5.10	5.00
7.00	9.00	8.70	8.40	8.20	7.80	7.60	7.40	7.00	6.90	6.80	6.70	6.50	6.30	6.20	6.10	6.00	5.80
8.00	10.20	9.90	9.60	9.30	9.00	8.70	8.40	8.00	7.90	7.70	7.60	7.40	7.20	7.10	6.90	6.80	6.60
10.00	13.00	12.00	12.00	12.00	11.00	11.00	10.00	10.00	9.90	9.70	9.50	9.30	9.00	8.90	8.70	8.50	8.30
12.00	15.00	15.00	14.00	14.00	13.00	13.00	13.00	12.00	12.00	12.00	11.00	11.00	11.00	11.00	10.00	10.00	10.00
13.00	17.00	16.00	16.00	15.00	15.00	14.00	14.00	13.00	13.00	13.00	12.00	12.00	12.00	12.00	11.00	11.00	11.00
15.00	19.00	19.00	18.00	17.00	17.00	16.00	16.00	15.00	15.00	15.00	14.00	14.00	14.00	13.00	13.00	13.00	12.00
16.00	20.00	20.00	19.00	19.00	18.00	17.00	17.00	16.00	16.00	15.00	15.00	15.00	14.00	14.00	14.00	14.00	13.00
20.00	26.00	25.00	24.00	23.00	22.00	22.00	21.00	20.00	20.00	19.00	19.00	19.00	18.00	18.00	17.00	17.00	17.00
25.00	32.00	31.00	30.00	29.00	28.00	27.00	26.00	25.00	25.00	24.00	24.00	23.00	23.00	22.00	22.00	21.00	21.00
32.00	41.00	40.00	38.00	37.00	36.00	35.00	33.00	32.00	32.00	31.00	30.00	30.00	29.00	28.00	28.00	27.00	26.00
35.00	45.00	43.00	41.00	41.00	38.00	38.00	36.00	35.00	35.00	34.00	33.00	32.00	32.00	32.00	30.00	29.00	29.00
40.00	51.00	50.00	48.00	47.00	45.00	43.00	42.00	40.00	39.00	39.00	38.00	37.00	36.00	35.00	35.00	34.00	33.00
50.00	64.00	62.00	60.00	58.00	56.00	54.00	52.00	50.00	49.00	48.00	47.00	46.00	45.00	44.00	43.00	42.00	41.00
63.00	81.00	78.00	76.00	73.00	71.00	68.00	66.00	63.00	62.00	61.00	60.00	58.00	57.00	56.00	55.00	53.00	52.00

### Influence of the Mains Frequency

Influence of the mains frequency on the tripping behavior  $I_{MA}$  of the instantaneous release

$I_{MA}(f)/I_{MA}(50\text{ Hz})$ [%]	Mains Frequency f [Hz]						
	16 2/3	50	60	100	200	300	400
	91	100	101	106	115	134	141

### Load Carrying Capacity of Adjoining Miniature Circuit Breakers





# 1.3

## Miniature Circuit Breakers and Supplementary Protectors

### UL 1077 DIN Rail Supplementary Protectors

1

#### Accessories Technical Data

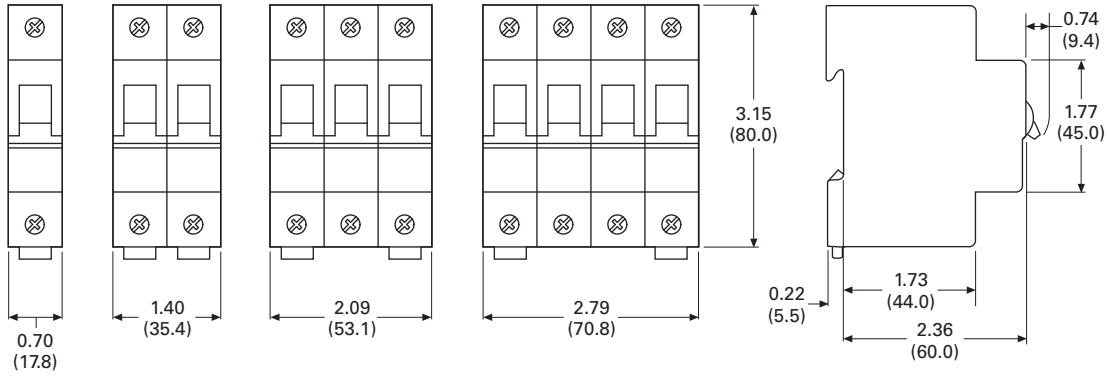
Description	FAZ-XHIN FAZ-XAM002	FAZ-XAA-C	FAZ-XUA
<b>Electrical</b>			
Contact function	1A + 1B 2 C/O	—	—
Rated operational voltage $U_n$	250 Vac	—	115 Vac 230 Vac 400 Vac
Voltage range	—	12–110 Vac 12–60 Vdc	—
Voltage range	—	110–415 Vac 110–230 Vdc	—
Closing threshold [ $\times U_n$ ]	—	—	0.8
Tripping threshold [ $\times U_n$ ]	—	—	0.5
Rated frequency $f$	50/60 Hz	50/60 Hz	50/60 Hz
General use (UL/CSA) AC—230/240 Vac DC—110/120 Vdc	2/2A 0.5/0.5A	—	—
Pilot duty	A600/Q600	—	—
Conventional free air thermal current $I_{th}$	4A	—	—
Rated operational current AC-13 $I_b$ AC-15 $I_b$ DC-13 $I_b$	3A (250 Vac) 2A (250 Vac) 0.5A (110 Vdc)	—	—
Rated insulation voltage $U_i$	250 Vac	—	—
Minimum operating voltage per contract $U_{min}$	5 Vdc	—	—
Rated impulse withstand voltage (1.2/50 $\mu$ ) $U_{imp}$	2.5 kV	—	—
Rated conditional short-circuit current with 6A backup fuse $I_{SC}$	1 kA	—	—
Max. admissible backup fuse	4A gL	—	—
<b>Mechanical</b>			
Standard front dimension	45 mm	45 mm	45 mm
Device height	80 mm	80 mm	80 mm
Mounting width	8.8 mm	17.6 mm	17.8 mm
Mounting	On MCB	IEC/EN 60715 top-hat rail	IEC/EN 60715 top-hat rail
Degree of protection enclosed	IP40	IP40	IP40
Terminal protection	Protection against electric shock to IEC 536	Protection against electric shock to IEC 536	Protection against electric shock to IEC 536
Terminals	Lift terminals	Twin-purpose terminals	Twin-purpose terminals
Terminal capacity Solid Flexible	0.5–2.5 mm <sup>2</sup> 0.5–2.5 mm <sup>2</sup>	1–2.5 mm <sup>2</sup> 1–2.5 mm <sup>2</sup>	2 x (1–2.5) mm <sup>2</sup> 2 x (1–2.5) mm <sup>2</sup>
Tightening torque of terminal screws	0.8–1.0 Nm (7–9 lb-in)	2.4 Nm (21 lb-in)	0.8 Nm (7 lb-in)

### Dimensions

Approximate Dimensions in Inches (mm)

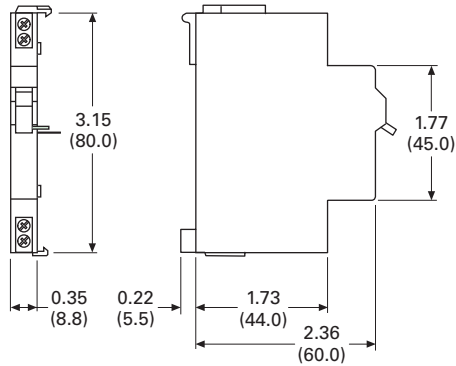
#### Miniature Circuit Breakers

##### FAZ

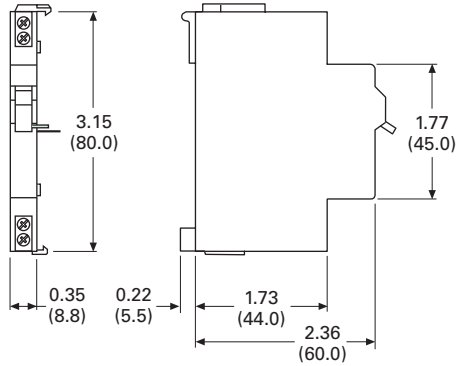


#### Auxiliary Contacts

##### FAZ-XHI11 and FAZ-XHI1NW1

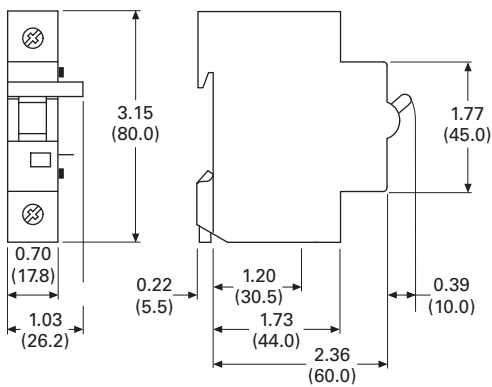


##### FAZ-XAM002



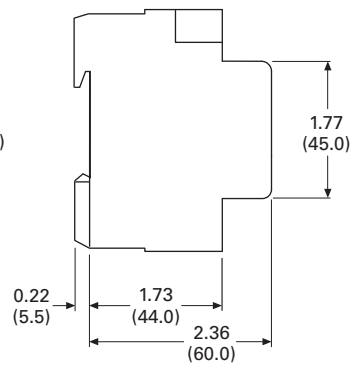
#### Shunt Releases

##### FAZ-XAA



#### Undervoltage Releases

##### FAZ-XUA



# 1.3

## Miniature Circuit Breakers and Supplementary Protectors

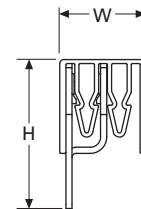
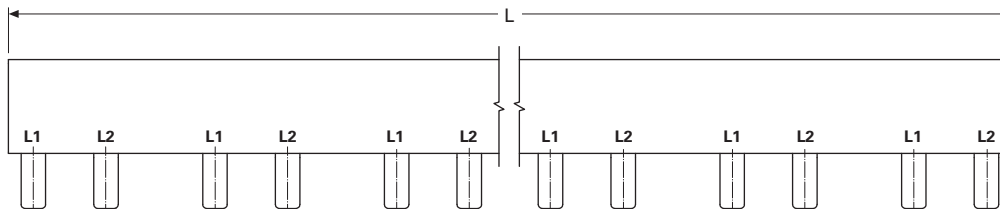
### UL 1077 DIN Rail Supplementary Protectors

1

Approximate Dimensions in Inches (mm)

#### Busbar and Accessory Weights and Dimensions

Unit Weight (kg)	Length	Width	Height	Catalog Number
0.29	39.72 (1009.0)	0.59 (15.0)	0.59 (15.0)	BB-UL-18/1P-1M/57
0.64	39.02 (991.0)	0.87 (22.0)	1.46 (37.0)	BB-UL-18/2P-2M/56
0.83	39.72 (1009.0)	0.87 (22.0)	1.46 (37.0)	BB-UL-18/3P-3M/57
0.26	38.78 (985.0)	0.59 (15.0)	0.59 (15.0)	BB-UL-18/1P-1.5M/37
0.63	39.72 (1009.0)	0.87 (22.0)	1.46 (37.0)	BB-UL-18/2P+AS-2.5M/46
0.79	38.66 (982.0)	0.87 (22.0)	1.46 (37.0)	BB-UL-18/3P+AS-3.5M/48
0.36	39.72 (1009.0)	0.59 (15.0)	0.59 (15.0)	BB-UL-25/1P-1M/57
0.79	39.02 (991.0)	0.87 (22.0)	1.46 (37.0)	BB-UL-25/2P-2M/56
1.04	39.72 (1009.0)	0.87 (22.0)	1.46 (37.0)	BB-UL-25/3P-3M/57
0.31	38.78 (985.0)	0.59 (15.0)	0.59 (15.0)	BB-UL-25/1P-1.5M/37
0.73	39.72 (1009.0)	0.87 (22.0)	1.46 (37.0)	BB-UL-25/2P+AS-2.5M/46
0.97	38.66 (982.0)	0.87 (22.0)	1.46 (37.0)	BB-UL-25/3P+AS-3.5M/48
0.03	2.36 (60.0)	0.67 (17.0)	1.14 (29.0)	BB-UL-TEP/35
0.03	1.42 (36.0)	0.67 (17.0)	1.14 (29.0)	BB-UL-TEPA/35
0.03	1.57 (40.0)	0.71 (18.0)	1.18 (30.0)	BB-UL-TE/50
0.003	3.35 (85.0)	0.47 (12.0)	0.94 (24.0)	BB-IP/5
0.001	0.55 (14.0)	0.20 (5.0)	0.39 (10.0)	BB-UL-EC/3
0.001	0.94 (24.0)	0.87 (22.0)	0.39 (10.0)	BB-UL-EC/1



### UL 1053 DIN Rail RCCB



### Contents

#### Description

UL 1053 DIN Rail RCCB 480/277 Vac	
Product Selection . . . . .	<b>V4-T1-88</b>
Accessories . . . . .	<b>V4-T1-89</b>
Technical Data and Specifications . . . . .	<b>V4-T1-90</b>
Dimensions . . . . .	<b>V4-T1-91</b>
UL 1053 DIN Rail RCCB 208Y/120 Vac . . . . .	<b>V4-T1-93</b>

### UL 1053 DIN Rail RCCB 480/277 Vac

#### Product Overview

Optimum product quality, tested reliability and safety stand for best protection of installations and plant. Eaton's UL 1053 Residual Current Circuit Breaker (RCCB) is designed for use in residual current applications.

#### Application Description

- Motor control circuits
- HVAC internal/external equipment
- PLCs
- HMIs
- Equipment protection
- European housing

#### Features

- Wide range of compact RCCB types serving as fault-current and additional protection according to UL 1053 and IEC/EN 61008 standards, suitable for worldwide use
- Type A or Type G/A (with delay) protection available
- Comprehensive range of accessories
- Real contact position indicator
- Fault current tripping indicator
- Transparent designation plate
- Trip-free design—RCCB can not be defeated by holding the handle in the ON position
- Captive screws cannot be lost

#### Standards and Certifications

- UL 1053
- IEC/EN 61008
- CSA
- ÖVE
- CE Marked



## Product Selection

## UL 1053 RCCB 480Y/277V Type A

## Two-Pole



## Conditionally Surge Current-Proof 250A, Sensitive to Residual Pulsating DC, Type A

## Two-Pole

Amperes	GF Sensitivity (mA)	Catalog Number <sup>①</sup>	Designation
25	30	167113	FRCmM-25/2/003-A-NA
	300	167116	FRCmM-25/2/03-A-NA
40	30	167114	FRCmM-40/2/003-A-NA
	300	167117	FRCmM-40/2/03-A-NA
63	30	167115	FRCmM-63/2/003-A-NA
	300	167118	FRCmM-63/2/03-A-NA

## Four-Pole



## Conditionally Surge Current-Proof 250A, Sensitive to Residual Pulsating DC, Type A

## Four-Pole

Amperes	GF Sensitivity (mA)	Catalog Number <sup>①</sup>	Designation
25	30	167125	FRCmM-25/4/003-A-NA
	300	167104	FRCmM-25/4/03-A-NA
40	30	167102	FRCmM-40/4/003-A-NA
	300	167105	FRCmM-40/4/03-A-NA
63	30	167103	FRCmM-63/4/003-A-NA
	300	167106	FRCmM-63/4/03-A-NA

## UL 1053 RCCB 480Y/277V Type G/A

Type G/A has a 10 ms delay.

## Two-Pole



## Surge Current-Proof 3 kA, Sensitive to Residual Pulsating DC, Type G/A (ÖVE E 8601)

## Two-Pole

Amperes	GF Sensitivity (mA)	Catalog Number <sup>①</sup>	Designation
25	30	167119	FRCmM-25/2/003-G/A-NA
	300	167122	FRCmM-25/2/03-G/A-NA
40	30	167120	FRCmM-40/2/003-G/A-NA
	300	167123	FRCmM-40/2/03-G/A-NA
63	30	167121	FRCmM-63/2/003-G/A-NA
	300	167124	FRCmM-63/2/03-G/A-NA

## Four-Pole



## Surge Current-Proof 3 kA, Sensitive to Residual Pulsating DC, Type G/A (ÖVE E 8601)

## Four-Pole

Amperes	GF Sensitivity (mA)	Catalog Number <sup>①</sup>	Designation
25	30	167107	FRCmM-25/4/003-G/A-NA
	300	167110	FRCmM-25/4/03-G/A-NA
40	30	167108	FRCmM-40/4/003-G/A-NA
	300	167111	FRCmM-40/4/03-G/A-NA
63	30	167109	FRCmM-63/4/003-G/A-NA
	300	167112	FRCmM-63/4/03-G/A-NA

**Note**

<sup>①</sup> Has no thermal element; must be paired with FAZ-NA or FAZ per application.

## Accessories

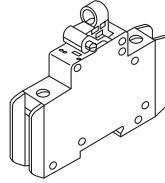
### UL 1053 DIN Rail RCCB 480/277 Vac

#### Contact



Description	Catalog Number
Two-pole contact or auxiliary contact / trip indicating contact	Z-NHK ①

#### Padlock Hasp



Description	Catalog Number
Padlock hasp	IS/SPE-1TE

**Note**

① Voltage of FAZ-NA circuit breaker is limited to 300V with this auxiliary contact installed.

**Technical Data and Specifications**

- Residual current devices
- Has no thermal protection; must be paired with FAZ-NA or FAZ per application
- Captive screw terminals
- Universal tripping signal switch, also suitable for Z-A; can be mounted subsequently
- Auxiliary switch Z-HK can be mounted subsequently
- Red-green contact position indicator
- White-blue tripping indicator
- Delayed types recommended for use with standard fluorescent tubes with or without electronical ballast (30mA-RCD: 30 units per phase conductor, 100mA-RCD: 90 units per phase conductor)
- The device functions irrespective of the position of installation
- Tripping is line voltage-independent. Consequently, the RCD is suitable for "fault current/residual current protection" and "additional protection" within the meaning of the applicable installation rules
- Reverse-feed permitted
- The four-pole device can also be used for two-pole connection. For this purpose, use terminals 5-6 and N-N
- The test key "T" must be pressed every month. The system operator must be informed of this obligation and responsibility in a way that can be proven (self-adhesive RCD-label enclosed)
- Pressing the test key "T" serves the only purpose of function testing the residual current device (RCD). This test does not make earthing resistance measurement (RE) or proper checking of the earth conductor condition redundant, which must be performed separately
- **Type -A:** Protects against special forms of residual pulsating DC that have not been smoothed
- **Type -G/A:** Additionally protects against special forms of residual pulsating DC that have not been smoothed

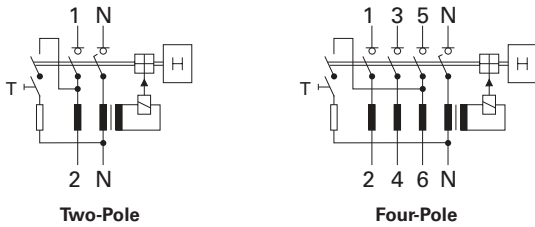
**UL 1053 DIN Rail RCCB Technical Data**

Description	Specification	
<b>Electrical According to IEC/EN 61008</b>		
Design according to	IEC/EN 61008 ÖVE E 8601	
Current test marks as printed onto the device		
Tripping Type G	10 ms delay	
Rated voltage $U_n$	230/400V, 50 Hz	
Rated tripping current $I_{\Delta n}$	30, 300 mA	
Sensitivity	AC and pulsating DC	
Rated insulation voltage $U_i$	440V	
Rated impulse withstand voltage $U_{imp}$	4 kV	
Rated short-circuit capacity $I_{nc}$	10 kA	
Maximum backup fuse	Overload protection	Short-circuit protection
$I_n = 25-40A$	25A gG/gL	63A gG/gL
$I_n = 63A$	40A gG/gL	63A gG/gL
Rated breaking capacity $I_m$ bzw. Rated fault breaking capacity $I_{\Delta m}$		
$I_n = 25-40A$	500A	
$I_n = 63A$	630A	
Voltage range of test button	Two-pole	184-250V~
	Four-pole	184-440V~
Endurance	Electrical	>4000 operating cycles
	Mechanical	>20,000 operating cycles
Overvoltage category	III	

**UL 1053 DIN Rail RCCB Technical Data, continued**

Description	Specification	
<b>Electrical According to UL 1053</b>		
Design according to	UL 1053	
Current test marks as printed onto the device		
Tripping Type G	8 ms delay	
Rated voltage $U_n$	480Y/277V, 60 Hz	
Pickup current	22, 200 mA	
Sensitivity	AC and pulsating DC	
Overvoltage tested	530V	
Rated impulse withstand voltage $U_{imp}$	4 kV	
Rated short-circuit capacity $I_{nc}$	5 kA according to CSA	
Maximum backup fuse	Overload protection	Short-circuit protection
$I_n = 25-40A$	25A gG/gL	63A gG/gL
$I_n = 63A$	40A gG/gL	63A gG/gL
Rated breaking capacity $I_m$ or Rated fault breaking capacity $I_{\Delta m}$		
$I_n = 25-40A$	500A	
$I_n = 63A$	630A	
Voltage range of test button	Two-pole	184-305V~
	Four-pole	184-528V~
Endurance	Electrical	>4000 operating cycles
	Mechanical	>20,000 operating cycles
<b>Mechanical</b>		
Frame size	45.0 mm	
Device height	80.0 mm	
Device width	35 mm (2TE), 70 mm (4TE)	
Device width	Quick fastening with two lock-in positions on DIN rail IEC/EN 60715	
Degree of protection, built-in	IP40	
Degree of protection in moisture-proof enclosure	IP54	
Upper and lower terminals	Lift terminals	
Terminal protection	Finger and hand touch safe BGV A3, ÖVE-EN 6	
Terminal capacity	1.5-35 mm <sup>2</sup> single-wire	
	2 x 16 mm <sup>2</sup> multi-wire	
Busbar material thickness	0.8-2 mm	
Tripping temperature	-25°C to +60°C	
Resistance to climatic conditions	According to IEC 61008	
Humidity	5-95%	

### Connection Diagram



### Impact of Ambient Temperature on the Maximum Permanent Current Allowed (A)

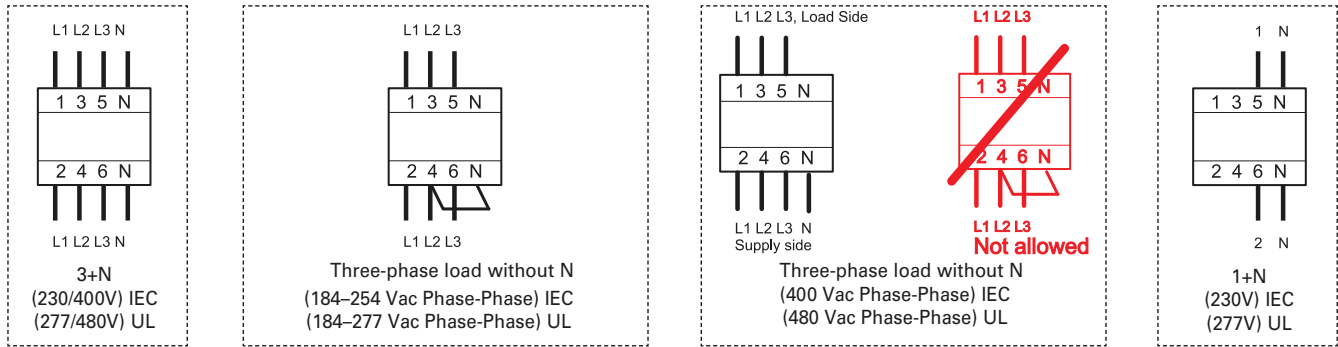
Tripping Temperature	16A		25A		40A		63A	
	Two-Pole	Four-Pole	Two-Pole	Four-Pole	Two-Pole	Four-Pole	Two-Pole	Four-Pole
40°C	16	16	25	25	40	40	63	63
45°C	14	14	21	22	37	37	59	59
50°C	11	11	18	19	33	34	55	55
55°C	9	9	14	16	30	31	50	50
60°C	①	—	—	—	26	27	45	45

#### Notes

① Do not use.

Please make sure that these values are not exceeded and that any upstream overload protection switches off in time.

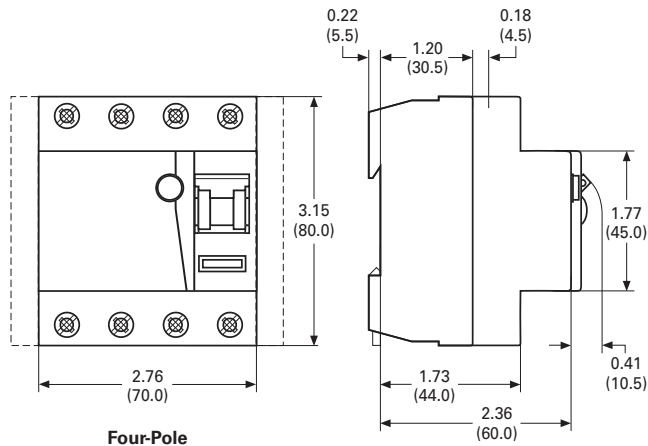
### Correct Connection



### Dimensions

Approximate Dimensions in Inches (mm)

### UL 1053 DIN Rail RCCB





## Accessories Technical Data

Description	Z-NHK
<b>Electrical</b>	
Contact function	2CO
Rated voltage	230V
Frequency	50/60 Hz
Rated current	2A
Rated thermal current $I_{th}$	2A
Utilization category AC13 Rated operational current $I_b$	3A/250 Vac
Utilization category AC15 Rated operational current $I_b$	2A/250 Vac
Utilization category DC12 Rated operational current $I_b$	0.5A/110 Vdc
Rated insulation voltage $U_i$	250 Vac
Minimum operational voltage per contact $U_{min}$	5 Vdc
Minimum operational current $I_{min}$	10 mA DC
Rated peak withstand voltage $U_{imp}$ (1.2/50 $\mu$ )	2.5 kV
Conditional short-circuit current $I_k$ with backup fuse 6A	1 kA
Maximum backup fuse, overload and short circuit	6A gL
<b>Mechanical</b>	
Tripping indicator "electrical tripping"	Blue/white
Frame size	45 mm
Device height	80 mm
Device width	8.8 mm (0.5MU)
Mounting	Onto switching device
Degree of protection, built-in	IP40
Terminal protection	Finger and hand touch safe According to BGV A3, ÖVE-EN 6
Terminals	Lift terminals
Terminal capacity	20–14 AWG
Terminal screws	M3 (Posidrive Z0)
Fastening torque of terminal screws	7 lb-in maximum

### UL 1053 DIN Rail RCCB



### Contents

#### Description

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#### Page

### UL 1053 DIN Rail RCCB 208Y/120 Vac

#### Product Overview

Optimum product quality, tested reliability and safety stand for best protection of installations and plant. Eaton's UL 1053 Residual Current Circuit Breaker (RCCB) is designed for use in residual current applications.

#### Application Description

- Motor control circuits
- HVAC internal/external equipment
- PLCs
- HMIs
- Equipment protection

#### Features

- Wide range of compact RCD type serving as fault-current and additional protection according to UL 1053 and IEC/EN 61008 standards, suitable for worldwide use in the 110V range of applications
- Type A or Type G/A (with delay) protection available
- Comprehensive range of accessories
- Real contact position indicator
- Fault current tripping indicator
- Transparent designation plate
- Trip-free design—RCCB can not be defeated by holding the handle in the ON position
- Captive screws cannot be lost

#### Standards and Certifications

- UL 1053
- IEC/EN 61008



## Product Selection

**UL 1053 RCCB 208Y/120 Vac Type A****Four-Pole****Conditionally Surge Current–Proof 250A, Sensitive to Residual Pulsating DC, Type A****Four-Pole**

Amperes	GF Sensitivity (mA)	Catalog Number <sup>①</sup>	Designation
25	30	<b>167699</b>	FRCmM-25/4/003-A-NA-110
	300	<b>167702</b>	FRCmM-25/4/03-A-NA-110
40	30	<b>167700</b>	FRCmM-40/4/003-A-NA-110
	300	<b>167703</b>	FRCmM-40/4/03-A-NA-110
63	30	<b>167701</b>	FRCmM-63/4/003-A-NA-110
	300	<b>167704</b>	FRCmM-63/4/03-A-NA-110

**UL 1053 RCCB 208Y/120 Vac Type G/A**

Type G/A has a 10 ms delay.

**Two-Pole****Surge Current–Proof 3 kA, Sensitive to Residual Pulsating DC, Type G/A (ÖVE E 8601)****Two-Pole**

Amperes	GF Sensitivity (mA)	Catalog Number <sup>①</sup>	Designation
25	30	<b>167693</b>	FRCmM-25/2/003-G/A-NA-110
	300	<b>167696</b>	FRCmM-25/2/03-G/A-NA-110
40	30	<b>167694</b>	FRCmM-40/2/003-G/A-NA-110
	300	<b>167697</b>	FRCmM-40/2/03-G/A-NA-110
63	30	<b>167695</b>	FRCmM-63/2/003-G/A-NA-110
	300	<b>167698</b>	FRCmM-63/2/03-G/A-NA-110

**Four-Pole****Surge Current–Proof 3 kA, Sensitive to Residual Pulsating DC, Type G/A (ÖVE E 8601)****Four-Pole**

Amperes	GF Sensitivity (mA)	Catalog Number <sup>①</sup>	Designation
25	30	<b>167705</b>	FRCmM-25/4/003-G/A-NA-110
	300	<b>167708</b>	FRCmM-25/4/03-G/A-NA-110
40	30	<b>167706</b>	FRCmM-40/4/003-G/A-NA-110
	300	<b>167709</b>	FRCmM-40/4/03-G/A-NA-110
63	30	<b>167707</b>	FRCmM-63/4/003-G/A-NA-110
	300	<b>167710</b>	FRCmM-63/4/03-G/A-NA-110

**Note**

<sup>①</sup> Has no thermal element; must be paired with FAZ-NA or FAZ per application.

## Accessories

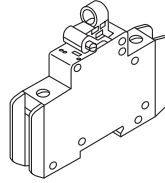
### UL 1053 DIN Rail RCCB 208Y/120 Vac

#### Contact



Description	Catalog Number
Two-pole contact or auxiliary contact / trip indicating contact	Z-NHK ①

#### Padlock Hasp



Description	Catalog Number
Padlock hasp	IS/SPE-1TE

**Note**

① Voltage of FAZ-NA circuit breaker is limited to 300V with this auxiliary contact installed.

**Technical Data and Specifications**

- Residual current devices
- Has no thermal protection; must be paired with FAZ-NA or FAZ per application
- Captive screw terminals
- Universal tripping signal switch, also suitable for Z-A; can be mounted subsequently
- Auxiliary switch Z-HK can be mounted subsequently
- Red-green contact position indicator
- White-blue tripping indicator
- Delayed types recommended for use with standard fluorescent tubes with or without electronical ballast (30mA-RCD: 30 units per phase conductor, 100mA-RCD: 90 units per phase conductor)
- The device functions irrespective of the position of installation
- Tripping is line voltage-independent. Consequently, the RCD is suitable for "fault current/residual current protection" and "additional protection" within the meaning of the applicable installation rules
- Reverse-feed permitted
- The four-pole device can also be used for two-pole connection. For this purpose, use terminals 5-6 and N-N
- The test key "T" must be pressed every month. The system operator must be informed of this obligation and responsibility in a way that can be proven (self-adhesive RCD-label enclosed)
- Pressing the test key "T" serves the only purpose of function testing the residual current device (RCD). This test does not make earthing resistance measurement (RE) or proper checking of the earth conductor condition redundant, which must be performed separately
- **Type -A:** Protects against special forms of residual pulsating DC that have not been smoothed
- **Type -G/A:** Additionally protects against special forms of residual pulsating DC that have not been smoothed

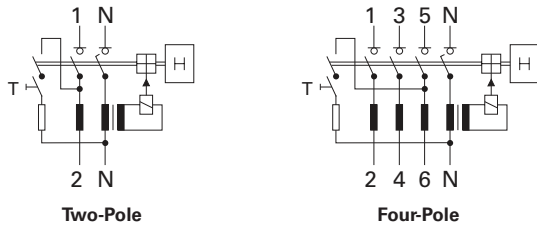
**UL 1053 DIN Rail RCCB Technical Data**

Description	Specification	
<b>Electrical According to IEC/EN 61008</b>		
Design according to	IEC/EN 61008 ÖVE E 8601	
Current test marks as printed onto the device		
Tripping Type G	10 ms delay	
Rated voltage $U_n$	230/400V, 50 Hz	
Rated tripping current $I_{\Delta n}$	30, 300 mA	
Sensitivity	AC and pulsating DC	
Rated insulation voltage $U_i$	440V	
Rated impulse withstand voltage $U_{imp}$	4 kV	
Rated short-circuit capacity $I_{nc}$	10 kA	
Maximum backup fuse	Overload protection	Short-circuit protection
$I_n = 25-40A$	25A gG/gL	63A gG/gL
$I_n = 63A$	40A gG/gL	63A gG/gL
Rated breaking capacity $I_m$ bzw. Rated fault breaking capacity $I_{\Delta m}$		
$I_n = 25-40A$	500A	
$I_n = 63A$	630A	
Voltage range of test button	Two-pole	100-132V-
	Four-pole	100-230V-
Endurance	Electrical	>4000 operating cycles
	Mechanical	>20,000 operating cycles
Overvoltage category	III	

**UL 1053 DIN Rail RCCB Technical Data, continued**

Description	Specification	
<b>Electrical According to UL1053</b>		
Design according to	UL 1053	
Current test marks as printed onto the device		
Tripping Type G	8 ms delay	
Rated voltage $U_n$	208Y/120V, 60 Hz	
Pickup current	22, 200 mA	
Sensitivity	AC and pulsating DC	
Overvoltage tested	530V	
Rated impulse withstand voltage $U_{imp}$	4 kV	
Rated short-circuit capacity $I_{nc}$	5 kA according to CSA	
Maximum backup fuse	Overload protection	Short-circuit protection
$I_n = 25-40A$	25A gG/gL	63A gG/gL
$I_n = 63A$	40A gG/gL	63A gG/gL
Rated breaking capacity $I_m$ or Rated fault breaking capacity $I_{\Delta m}$		
$I_n = 25-40A$	500A	
$I_n = 63A$	630A	
Voltage range of test button	Two-pole	100-121V-
	Four-pole	100-210V-
Endurance	Electrical	>4000 operating cycles
	Mechanical	>20,000 operating cycles
<b>Mechanical</b>		
Frame size	45.0 mm	
Device height	80.0 mm	
Device width	35 mm (2TE), 70 mm (4TE)	
Device width	Quick fastening with two lock-in positions on DIN rail IEC/EN 60715	
Degree of protection, built-in	IP40	
Degree of protection in moisture-proof enclosure	IP54	
Upper and lower terminals	Lift terminals	
Terminal protection	Finger and hand touch safe BGV A3, ÖVE-EN 6	
Terminal capacity	1.5-35 mm <sup>2</sup> single-wire	
	2 x 16 mm <sup>2</sup> multi-wire	
Busbar material thickness	0.8-2 mm	
Tripping temperature	-25°C to +60°C	
Resistance to climatic conditions	According to IEC 61008	
Humidity	5-95%	

### Connection Diagram



### Impact of Ambient Temperature on the Maximum Permanent Current Allowed (A)

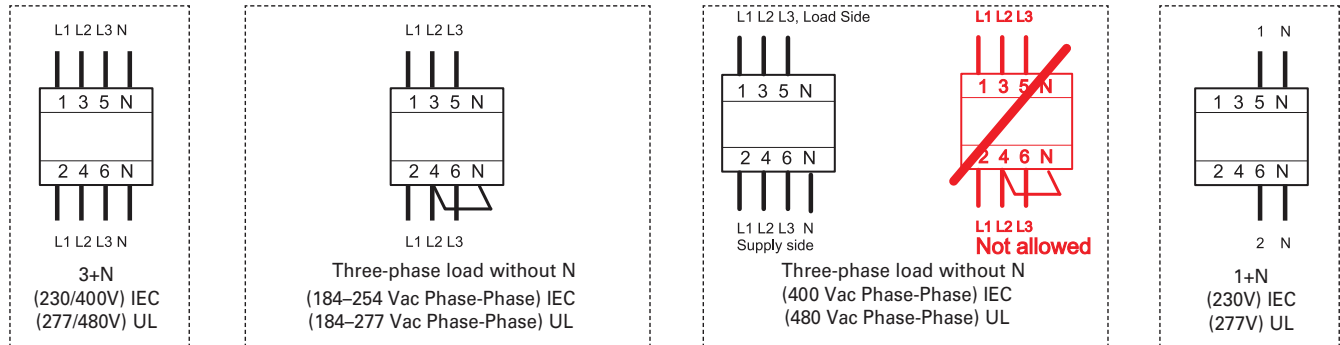
Tripping Temperature	16A		25A		40A		63A	
	Two-Pole	Four-Pole	Two-Pole	Four-Pole	Two-Pole	Four-Pole	Two-Pole	Four-Pole
40°C	16	16	25	25	40	40	63	63
45°C	14	14	21	22	37	37	59	59
50°C	11	11	18	19	33	34	55	55
55°C	9	9	14	16	30	31	50	50
60°C	①	—	—	—	26	27	45	45

#### Notes

① Do not use.

Please make sure that these values are not exceeded and that any upstream overload protection switches off in time.

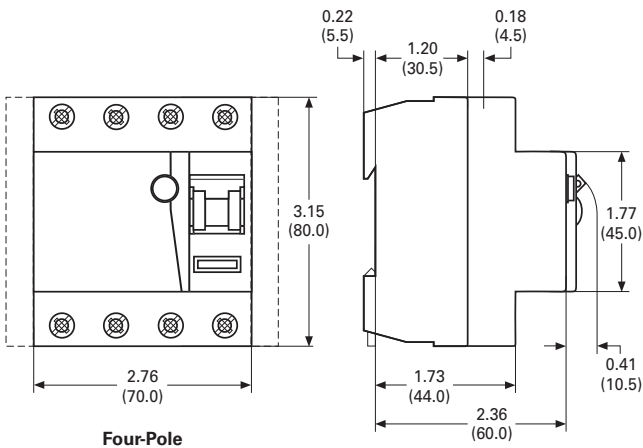
### Correct Connection



### Dimensions

Approximate Dimensions in Inches (mm)

### UL 1053 DIN Rail RCCB



## Accessories Technical Data

Description	Z-NHK	Z-IHK-NA
<b>Electrical</b>		
Contact function	2CO	1NO + 1NC
Rated voltage	230V	250V
Frequency	50/60 Hz	50/60 Hz
Rated current	2A	6A
Rated thermal current $I_{th}$	2A	6A
Utilization category AC13 Rated operational current $I_b$	3A/250 Vac	3A/250 Vac
Utilization category AC15 Rated operational current $I_b$	2A/250 Vac	2A/250 Vac
Utilization category DC12 Rated operational current $I_b$	0.5A/110 Vdc	0.5A/110 Vdc 0.25A/220 Vdc
Rated insulation voltage $U_i$	250 Vac	250 Vac
Minimum operational voltage per contact $U_{min}$	5 Vdc	5 Vdc
Minimum operational current $I_{min}$	10 mA DC	10 mA AC/DC
Rated peak withstand voltage $U_{imp}$ (1.2/50 $\mu$ )	2.5 kV	4 kV
Conditional short-circuit current $I_k$ with backup fuse 6A	1 kA	1 kA
Maximum backup fuse, overload and short circuit	6A gL	—
<b>Mechanical</b>		
Tripping indicator "electrical tripping"	Blue/white	—
Frame size	45 mm	45 mm
Device height	80 mm	80 mm
Device width	8.8 mm (0.5MU)	8.8 mm (0.5MU)
Mounting	Onto switching device	—
Degree of protection, built-in	IP40	IP40
Terminal protection	Finger and hand touch safe According to BGV A3, ÖVE-EN 6	Finger and hand touch safe According to BGV A3, ÖVE-EN 6
Terminals	Lift terminals	Lift terminals
Terminal capacity	20–14 AWG	0.5–2.5 mm <sup>2</sup>
Terminal screws	M3 (Posidrive Z0)	M3 (Posidrive Z0)
Fastening torque of terminal screws	7 lb-in maximum	1.2 Nm

**Series G Circuit Breakers**



<b>2.1</b>	<b>Introduction</b>	
	Product Overview	V4-T2-2
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	M-Frame (300–800 Amperes)	V4-T2-205
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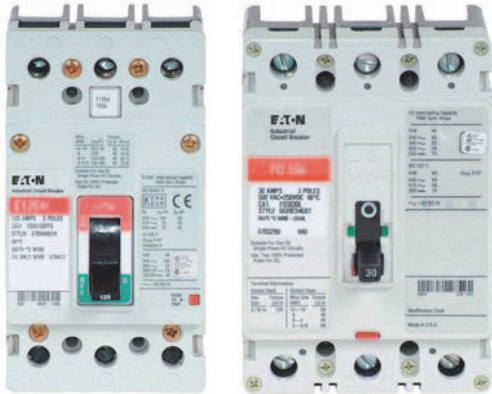
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### Series G E-Frame and Series C F-Frame Molded Case Circuit Breakers



### Product Overview

#### Series G vs. Series C

Eaton's Electrical Sector, under the Eaton brand, offers the widest variety of molded case circuit breakers available today. Designed for electrical and machinery OEMs serving a range of industries and applications, these proven designs incorporate the latest in innovation with the high reliability that has been our hallmark since the advent of the circuit breaker in the 1920s.

The Series C family ranges from 15–2500 amperes, and includes thermal-magnetic breakers, electronic trip breakers, molded case switches, motor circuit protectors, and specially designed breakers for engine generator, DC and mining applications.

The new Series G line features an average 35% size reduction, common field-installable internal accessories, and advanced trip unit functionality that eliminates the need for rating plugs. These breakers meet the requirements of UL®, CSA®, IEC, CCC and CE, allowing the OEM to standardize on a design that meets the needs of their global customer base.

### Application Description

Eaton molded case circuit breakers cover the widest range of applications in the industry:

- Electrical OEMs
- Machinery OEMs
- Navy breakers:
  - UL 489 Supplement SB
  - MIL-C-17588
  - MIL-C-17361
  - ABS/NVR
- Mining breakers up to 1100 Vac
- Earth leakage
- DC breakers 125–750 Vdc
- Engine generator breakers 15–1200 amperes
- Current limiting breakers

### Typical Applications

#### Machine Tool Control Panels and Motor Control Centers

Designed for these equipment requirements, including new world-class accessories.

#### Panelboards

As both main and branch circuit protection devices.

### Contents

#### Description

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#### Feeder Pillars

In distribution systems to provide main and branch circuit protection.

#### Switchgear

In distribution systems to provide main and branch circuit protection up to 2500 amperes (RG-Frame).

#### Busbar Trunking Tap-Offs

In busbar trunking tap-offs to provide circuit protection.

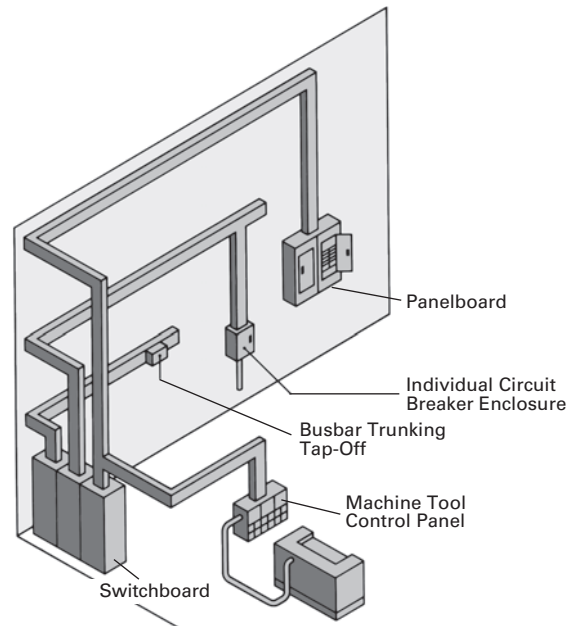
#### Individual Enclosures

Completely assembled in enclosures to meet specific customer requirements.

#### Additional Applications

Special versions of each Eaton frame are available to provide safe equipment control and protection in mining and other applications. Contact your Eaton agent or distributor for additional information.

### Typical Eaton Applications



## Eaton Molded Case Circuit Breakers in Assemblies

## Series G

Frame	Ampere Range	Panelboards					Switchboards		Motor Control Centers		Enclosed Control	Bus Plugs	Enclosed Breaker
		1A	2A	3A	4	5P	PRL-C	IFS	Freedom	IT.			
EG	15–160 <sup>①</sup>	—	—	—	—	—	—	—	■	■	■	—	—
JG	20–250	—	—	—	—	—	—	—	—	—	—	—	—
LG	100–630 <sup>②</sup>	—	—	—	■	—	■	■	—	—	—	—	■
NG	400–1600 <sup>③</sup>	—	—	—	—	—	—	—	■	■	—	—	■
RG	800–2500	—	—	—	—	—	—	—	■	■	—	—	—

## Series C

Frame	Ampere Range	Panelboards					Switchboards		Motor Control Centers		Enclosed Control	Bus Plugs	Enclosed Breaker
		1A	2A	3A	4	5P	PRL-C	IFS	Freedom	IT.			
FD/ED	15–225	■	■	■	■	■	■	■	■	■	■	■	■
JD	70–250	■	■	■	■	■	■	■	■	■	■	■	■
KD	70–400	■	■	■	■	■	■	■	■	■	■	■	■
LD	400–600	—	—	—	■	■	■	■	■	■	■	■	■
MDL	300–800	—	—	—	■	■	■	■	■	■	■	■	■
ND	400–1200	—	—	—	■	■	■	■	■	■	■	■	■
RD	800–2500	—	—	—	—	■	■	■	■	■	—	—	—

**Notes**

- ① 125 amperes is the maximum UL and CSA rating for EG.  
 ② 600 amperes is the maximum UL and CSA rating for LG.  
 ③ 1200 amperes is the maximum UL and CSA rating for NG.

Series G, 15–2500 Amperes for UL, CSA and IEC Applications

2



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## Product Overview

### **Series G, 15–2500 Amperes for UL, CSA and IEC Applications**

Eaton Series G molded case circuit breakers provide increased performance in considerably less space than standard circuit breakers or comparable fusible devices.

The “G” signifies global applications: Series G circuit breakers are marked with UL, CSA, CE, IEC and KEMA KEUR listings. Other advantages include:

- Field-fit accessories
- Common accessories through 630 amperes
- Electronic trip units from 20 to 2500 amperes
- UL-listed and IEC-rated, 30 mA ground fault/earth leakage modules
- Built-in ground fault protection down to 20 amperes

The EG, JG and LG frames are designed around space-saving footprints. The NG and RG use the proven Eaton Series C ND and RD designs.

The Series G family includes five frame sizes in ratings from 15 to 2500 amperes. Series G offers a choice of several interrupting capacities up to 200 kA at 480 volts AC (200 kA at 240 volts AC).

Series G molded case circuit breakers are also available in direct current options. Please see Specialty Breakers **Section 2.6** for more details.

Standard calibration is 40°C. For applications in high ambient temperature conditions, 50°C factory calibration is available on thermal-magnetic breakers (not UL).

### **The Most Logically Designed Contact Assembly**

The flexibility and outstanding performance characteristics of Eaton circuit breakers are made possible by the best contact designs in circuit breaker history. Our technology creates a high-speed “blow-open” action using the electromechanical forces produced by high-level fault currents.

Eaton circuit breakers are operated by a toggle-type mechanism that is mechanically trip-free from the handle so that the contacts cannot be held closed against short circuit currents. Tripping due to overload or short circuits is clearly indicated by the position on the handle. This remarkably fast and dependable contact action is designed to enhance safety.

### **Thorough In-Plant Testing**

The quality, dependability and reliability of every Eaton Circuit Breaker is ensured by a thorough program of in-plant testing. Two calibration tests are conducted on every pole of every circuit breaker to verify the trip mechanism, operating mechanism, continuity and accuracy.

### **Current Limiting Characteristics**

Circuit breakers are current limiting because of their high repulsion contact arrangement and use of state-of-the-art arc extinguishing technology.

Eaton offers one of the most complete lines of current limiting breakers in the industry. The industrial breakers are available in current limiting versions with interrupting capacities up to 200 kA at 480V without fuses in the same physical size as standard and high interrupting capacity breakers.

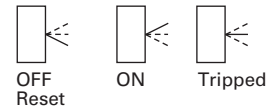
### Operating Mechanisms

Eaton circuit breakers have a toggle handle operating mechanism, which also serves as a switching position indicator. The indicator shows the positions of: ON, OFF and TRIPPED.

The toggle handle snaps into the TRIPPED position if the breaker is tripped by one of its overcurrent, short circuit, shunt or undervoltage releases. Before the circuit breaker can be reclosed following a trip-out, the toggle handle must be brought beyond the OFF position (RESET). The circuit breaker can then be reclosed.

As an additional switching position indicator for EG- to RG-Frame circuit breakers, there are two windows on the right and on the left of the toggle handle, in which the switching state is indicated by means of the colors red, green and white corresponding to the ON, OFF and TRIPPED positions respectively.

### Positions of the Toggle Handle Drive



### Standards and Certifications

Eaton Series G circuit breakers meet applicable UL 489 and IEC 60947-2 standards.

Molded case circuit breakers from Eaton are designed to conform with the following international standards:

- Australian Standard AS 2184 and AS 3947-2 molded case circuit breakers
- British Standards Institution Standard EN60947.2
- International Electromechanical Commission Recommendations IEC 60947.2 circuit breakers
- CE
- Japanese T-Mark standard molded case circuit breakers
- National Electrical Manufacturers Association Standards Publication No. AB1-1993 molded case circuit breakers
- South African Bureau of Standards, Standard SANS 156, Standard Specification for molded case circuit breakers
- Swiss Electro-Technical Association Standard SEV 947.2, Safety Regulations for circuit breakers
- Union Technique de l'Electricite Standard NF C 63-120, low voltage switchgear and control gear circuit breaker requirements
- Verband Deutscher Elektrotechnike (Association of German Electrical Engineers) Standard VDE 0660, low voltage switchgear and control gear, circuit breakers

### Global Third-Party Certification

Certification marks ensure product compliance with the total standard via the third party witnessing of tests by globally recognized independent certification organizations.

KEMA is a highly recognized, independent international organization that offers certification and inspection facilities for equipment in many industries. The KEMA-KEUR mark is the highest certification an electrical product can receive from KEMA. Our IEC 60947-2 molded case circuit breakers are KEMA tested and certified. These breakers are also listed in accordance with UL 489, as well as CSA C22.2 No. 5-02.

KEMA, UL and CSA provide ongoing follow-up testing and inspections to ensure that Eaton molded case circuit breakers continue to meet their exacting standards.

### ISO Certification

Eaton circuit breakers are manufactured in ISO® certified facilities.

## Product Selection Overview

### Electronic Trip Units (Digitrip RMS Trip Units)—Multi-Function Electronic Trip Units for All Applications

2

#### True rms Sensing

Digitrip rms trip units use Eaton's microprocessor-based intelligence to provide true rms sensing, permitting increased accuracy and reliable system protection. True rms sensing is not susceptible to nuisance tripping when waveforms containing high harmonic currents are present.

#### Digitrip RMS 310+

Digitrip RMS 310+ electronic trip units are available with Eaton circuit breakers JG, LG, NG and RG. They are selectable long time delay ( $t_{LD}$ ) and pickup settings ( $I_p$ ). A rating plug is not required. The Digitrip 310+ offers true rms sensing, is front adjustable and has an optional local display of current and cause of trip.

#### Rating Plugs

If rating plugs are needed for the R-Frame, they are marked for 50/60 Hz applications. Both fixed and adjustable rating plugs are available, providing further flexibility when applied to selectively coordinated systems.

#### Curve Shaping

When selectively coordinated systems are called for, Digitrip RMS 310+ will provide a cost-effective solution for a variety of applications.

The standard Digitrip RMS 310+ includes an adjustable short time pickup setting encompassing an  $I^2t$  ramp function that provides the basic LS curve shaping function. JG-, LG-, NG- and RG-Frames have an adjustable long time delay.

JG-, LG-, NG- and RG-Frames have selectable long time delay ( $t_{LD}$ ) and pickup settings ( $I_p$ ). A rating plug is not required.

The optional Digitrip RMS 310+ provides additional flat response short time delay adjustments on an instantaneous setting to provide LSI curve shaping capability.

Digitrip RMS 310+ trip units are available with ground fault pickup and flat response ground fault delay, which provides the trip unit with full function LSG and LSIG curve shaping flexibility.

Digitrip RMS 310+ trip units can effectively coordinate with both sophisticated upstream power breakers as well as downstream thermal-magnetic breakers, making Digitrip RMS 310+ trip units the cost-effective reliable choice for selectively coordinated systems.

#### Thermal Memory

All Digitrip RMS trip units incorporate a long delay. Thermal memory prevents the system from cumulative overheating due to repeated overcurrent events that may occur in quick succession.

#### Field Testing

A field test kit is available for Digitrip RMS 310+ trip units.

#### Arcflash Reduction Maintenance Mode (ARMS)

ARMS is an available feature on the LG- and NG-Frame with 310+ electronic trip units. This feature increases worker safety by providing an accelerated instantaneous trip unit to reduce arc flash.

#### Digitrip RMS 610 and 910

Digitrip RMS 610 and 910 trip units are available with Eaton R-Frame circuit breakers 800 through 2500 amperes. Digitrip 610 and 910 trip units provide unparalleled system protection with the added convenience of a local display.

#### Curve Shaping

Digitrip RMS 610 and 910 trip units are available with up to nine curve shaping choices achieved by adjusting up to seven switches on the front of the unit for optimum system coordination. Maximum curve shaping flexibility is provided by dependent long and short delay adjustments that are long delay pickup ( $I_p$ ) based, depicted on the front of the unit by the blue portion of the time-current curve.

Additional coordination capability can be provided by utilizing the short delay and ground fault zone selective interlocking features available on these trip units.

#### System Diagnostics

Digitrip RMS 610 and 910 models of trip units provide long delay, short delay, instantaneous, and ground fault cause of trip LEDs on the front of the unit. Their display shows a magnitude of trip information, as well as remote signal contacts, for improved system alarming.

#### System Monitoring

Digitrip 610 and 910 trip units have the capability to monitor phase currents, as well as neutral or ground currents. This information is displayed on a large digital display mounted on the unit.

Digitrip RMS 910 trip units can also provide the user with power and energy monitoring capability. Peak power demand, present power demand, and total energy, as well as forward and reverse energy can be monitored with this unit.

Digitrip RMS 910 trip units have the additional capability of monitoring line-to-line voltage, as well as system power factor. Both parameters are displayed in the digital display window and are supported by LEDs to indicate which parameter is being displayed.

#### Harmonics Monitoring

Digitrip RMS 910 trip units are capable of displaying values of current harmonics in the digital display window. Percentage of harmonic content can be monitored for each phase, up to the 27th harmonic. Additionally, a total harmonic distortion value can be calculated and displayed.

#### Communications

Digitrip RMS 910 units have built-in communications options to allow all protection, monitoring, and control information to be transmitted back to a central location via the Eaton PowerNet™ system.

#### Field Testing

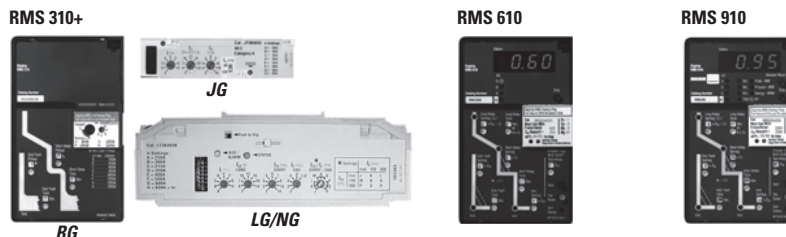
Integral field testing capability is provided on all 610 and 910 trip units. No additional test set is needed to perform both trip and no trip field testing.

## Product Selection Guide

## Electronic Trip Units

## Digitrip—RMS 310+, 610 and 910

2



Breaker Type		RMS 310+	RMS 610	RMS 910
Eaton frame(s)		JG-, LG-, NG- and RG-Frames	RG-Frame	RG-Frame
Ampere rating		20–2500A	800–2500A	800–2500A
Interrupting rating at 415V		35, 70, 100 kA	70, 100 kA	70, 100 kA
Trip Unit Sensing				
rms sensing		Yes	Yes	Yes
Protection and Coordination				
Protection	Ordering options	LS, LSG	LSI, LSIG	LI, LS, LSI, LIG, LSG, LSIG
	Fixed rating plug ( $I_n$ ) <sup>①</sup>	Yes	Yes	Yes
	Overtemperature trip	Yes	Yes	Yes
Long delay	Adjustable rating plug ( $I_n$ ) <sup>①</sup>	Yes	Yes	No
	Long delay setting	0.5–1.0 ( $I_n$ ) <sup>②</sup>	0.5–1.0 ( $I_n$ ) <sup>②</sup>	0.5–1.0 x ( $I_n$ )
	Long delay time $I^2t$ at 6x	10 seconds <sup>③</sup>	10 seconds <sup>③</sup>	2–24 seconds
	Long delay thermal memory	Yes	Yes	Yes
	High load alarm	No	No	0.85 x $I_r$
Short delay	Short delay setting	VAR/frame <sup>④</sup>	VAR/frame <sup>④</sup>	200–600% S1 and S2 x ( $I_r$ )
	Short delay time $I^2t$	100 ms	No	100, 300, 500 ms
	Short delay time flat	No	1–300 ms	100–500 ms
	Short delay time ZSI	No	No	Yes
Instantaneous	Instantaneous setting	No	200–800% x ( $I_n$ ) <sup>④</sup>	200–600% M1 and M2 x ( $I_n$ )
	Discriminator	No	No	Yes <sup>⑤</sup>
	Instantaneous override	Yes	Yes	Yes
Ground fault	Ground fault setting	VAR/Frame <sup>⑥</sup>	VAR/Frame <sup>⑥</sup>	25–100% x ( $I_n$ ) <sup>⑥</sup>
	Ground fault delay $I^2t$ at 0.62x	No	No	100, 300, 500 ms
	Ground fault delay flat	1–500 ms <sup>⑦</sup>	1–500 ms <sup>⑦</sup>	100–500 ms
	Ground fault ZSI	No	No	Yes
	Ground fault thermal memory	No	No	Yes

**Notes**

$I_n$  = Rating plug rating.  
 $I_r$  = Long delay setting.

① JG- and LG-Frames have selectable settings instead of a rating plug.

② JG-, LG- and NG-Frames have adjustable long delay times of 2–24 seconds.

③ JG/LG: 2X–14X ( $I_n$ ); NG: 2X–8X ( $I_n$ ); RG: 2X–8X ( $I_n$ ); 2500 ampere RG-Frame 200–600% x ( $I_n$ ).

④ JG-Frame also has a 14X setting.

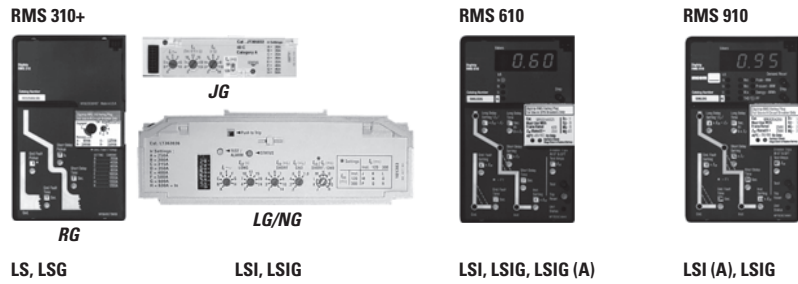
⑤ LS, LSG only.

⑥ Not to exceed 1200 amperes.

⑦ JG- and LG-Frames are Instantaneous, 120 ms. NG- and RG-Frames are Instantaneous, 100, 300 and 500 ms.

#### Digitrip—RMS 310+, 610 and 910, continued

2



	RMS 310+ RG	JG LSI, LSIG	RMS 610 LSI, LSIG, LSIG (A)	RMS 910 LSI (A), LSIG
<b>System Diagnostics</b>				
Cause of trip LEDs	Yes <sup>①</sup>	No	Yes	Yes
Magnitude of trip information	No	No	Yes	Yes
Remote signal contacts	No	No	Yes	Yes
<b>System Monitoring</b>				
Digital display	Yes <sup>②</sup>	No	Yes	Yes
Current	Yes <sup>②</sup>	No	Yes	Yes
Voltage	Yes <sup>②</sup>	No	No	Yes
Power and energy	Yes <sup>②</sup>	No	No	Yes
Power quality—harmonics	No	No	No	Yes
Power factor	No	No	No	Yes
<b>System Communications</b>				
PowerNet	No	No	No	Yes
<b>Field Testing</b>				
Testing method	Test set	Test set	Integral	Integral

**Notes**

- ① Using cause of trip module (catalog number **TRIP-LED**).
- ② Using ammeter or remote ammeter/cause of trip display (catalog number **DIGIVIEW** and **DIGIVIEWR06**).

Technical Data and Specifications

Ratings

Frames EG, JG and LG

EG



JG



LG



Maximum rated current (amperes)	125, 160 <sup>①</sup>								250						400, 630 <sup>②</sup>							
Breaker type <sup>③</sup>	B	B	E	S	S	H	H	C	E	S	H	C	U	X	E	S	H	C	U	X		
Number of poles	1	2, 3, 4	2, 3, 4	1	2, 3, 4	1	2, 3, 4	3, 4	2, 3, 4	2, 3, 4	2, 3, 4	3, 4	3, 4	3, 4	3, 4	3, 4	3, 4	3, 4	3, 4	3, 4		
<b>Breaker Capacity (kA rms) Vac 50–60 Hz</b>																						
NEMA <sup>®</sup> , UL, CSA	240 Vac	25	25	35	85	85	100	100	200	65	85	100	200	200	200	65	85	100	200	200	200	
	480 Vac	—	18	25	—	35	—	65	100	25	35	65	100	150	200	35	50	65	100	150	200	
	600 Vac <sup>④</sup>	—	—	18	—	22	—	25	35	18	18	25	35	50	50	18	25	35	50	65	65	
	125/250 Vdc <sup>⑤</sup>	10 <sup>⑥</sup>	10	10	35 <sup>⑥</sup>	35	42 <sup>⑥</sup>	42	42	10	22	22	42	50	50	22	22	42	42	50	50	
IEC 60947-2	220–240 Vac	<i>I<sub>CU</sub></i>	25	25	35	85	85	100	100	200	65	85	100	200	200	200	65	85	100	200	200	200
		<i>I<sub>CS</sub></i>	25	25	35	43	43	50	50	200	65	85	100	200	200	200	65	85	100	200	200	200
	380–415 Vac	<i>I<sub>CU</sub></i>	—	18	25	—	40	—	70	100	25	40	70	100	150	200	35	50	70	100	150	200
		<i>I<sub>CS</sub></i>	—	18	25	—	30	—	35	100	25	40	70	100	150	200	35	50	53	100	150	200
	660–690 Vac	<i>I<sub>CU</sub></i>	—	—	—	—	—	—	—	—	12	12	14	16	18	18	12	20	25	30	35	35
		<i>I<sub>CS</sub></i>	—	—	—	—	—	—	—	—	6	6	7	12	14	14	6	10	13	15	18	18
	125/250 Vdc <sup>⑤</sup>	<i>I<sub>CU</sub></i>	10 <sup>⑥</sup>	10	10	35 <sup>⑥</sup>	35	42 <sup>⑥</sup>	42	42	10	22	22	42	50	50	22	22	42	42	50	50
		<i>I<sub>CS</sub></i>	10 <sup>⑥</sup>	10	10	35 <sup>⑥</sup>	35	42 <sup>⑥</sup>	42	42	10	22	22	42	50	50	22	22	42	42	50	50
Ampere range	15–160A <sup>①</sup>								20–250A						100–630A <sup>②</sup>							
Trip Units F = Fixed A = Adjustable T = Thermal M = Magnetic	FT-FM AT-FM								FT-AM AT-AM Electronic (Digitrip RMS 310)						FT-AM AT-AM Electronic (Digitrip RMS 310)							
Interchangeable	—								■						■							
	■								■						■							
Thermal magnetic	■								■						■							
	■								■						■							
Magnetic	Fixed								Adjustable						Adjustable							
	—								■						■							
Electronic RMS <sup>⑦</sup>	LS	—	—	—	—	—	—	—	—	■	■	■	■	■	■	■ <sup>⑤</sup>	■ <sup>⑤</sup>	■ <sup>⑤</sup>	■ <sup>⑤</sup>	■ <sup>⑤</sup>	■ <sup>⑤</sup>	
	LSI	—	—	—	—	—	—	—	—	■	■	■	■	■	■	■ <sup>⑤</sup>	■ <sup>⑤</sup>	■ <sup>⑤</sup>	■ <sup>⑤</sup>	■ <sup>⑤</sup>	■ <sup>⑤</sup>	
	LSG	—	—	—	—	—	—	—	—	■	■	■	■	■	■	■ <sup>⑤</sup>	■ <sup>⑤</sup>	■ <sup>⑤</sup>	■ <sup>⑤</sup>	■ <sup>⑤</sup>	■ <sup>⑤</sup>	
	LSIG	—	—	—	—	—	—	—	—	■	■	■	■	■	■	■ <sup>⑤</sup>	■ <sup>⑤</sup>	■ <sup>⑤</sup>	■ <sup>⑤</sup>	■ <sup>⑤</sup>	■ <sup>⑤</sup>	
Utilization category	A								A						A							

Notes

- ① 125 amperes is the maximum UL and CSA rating for the EG.
- ② 630 amperes is not a UL or CSA listed rating. 600 amperes is the maximum UL and CSA listed rating for the LG.
- ③ Breaker type C, U and X are current limiting per UL 489.
- ④ EG breaker rated 600/347 Vac.
- ⑤ Two poles in series.
- ⑥ 125 Vdc only for single-pole breakers.
- ⑦ Not suitable for DC application. Four-pole ground fault not available.



# 2.2

## Molded Case Circuit Breakers

### Series G

#### Frames NG and RG

2

NG



RG



Maximum rated current (amperes)		800, 1200	800, 1200	800, 1200	1600 <sup>①</sup>	800	1600, 2000, 2500	1600, 2000, 2500	
Breaker type		S	H	C <sup>②</sup>	S	U	H	C <sup>②</sup>	
Number of poles		2, 3, 4	2, 3, 4	2, 3, 4	3	3	3, 4	3, 4	
<b>Breaker Capacity (kA rms) AC 50–60 Hz</b>									
NEMA, UL, CSA	240 Vac	85	100	200	—	200	125	200	
	480 Vac	50	65	100	—	150	65	100	
	600 Vac	25	35	65	—	65	50	65	
IEC 60947-2	220–240 Vac	$I_{cu}$	85	100	200	85	—	135	200
		$I_{cs}$	85	100	100	85	—	100	100
	380–415 Vac	$I_{cu}$	50	70	100	50	—	70	100
		$I_{cs}$	50	50	50	50	—	50	50
	660–690 Vac	$I_{cu}$	20 <sup>③</sup>	25 <sup>③</sup>	35	20 <sup>③</sup>	—	25 <sup>③</sup>	35 <sup>③</sup>
		$I_{cs}$	10	13	18	10	—	13	18
250 Vdc	$I_{cu}$	—	—	—	—	—	—	—	
	$I_{cs}$	—	—	—	—	—	—	—	
Ampere range		400–1200A	400–1200A	400–1200A	1600A	800A	800–2500A	800–2500A	
Trip units		Electronic (Digitrip RMS 310+)				Electronic (Digitrip RMS 310+, 610 and 910)			
	Interchangeable	—	—	—	—	—	—	—	
	Built-in	■	■	■	■	■	■	■	
Electronic <sup>④</sup>	LI	—	—	—	—	—	■ <sup>⑤</sup>	■ <sup>⑤</sup>	
	LS	■	■	■	■	■	■	■	
	LSI	■	■	■	■	■	■	■	
	LIG	—	—	—	—	—	■ <sup>⑤</sup>	■ <sup>⑤</sup>	
	LSG	■	■	■	■	■	■	■	
	LSIG	■	■	■	■	■	■	■	
	ALSI	■	■	■	■	—	■	■	
	ALSIG	■	■	■	■	—	■	■	
Utilization category		A	A	A	A	A	A	A	

#### Notes

- ① NG 1600 ampere frame is not UL or CSA listed.
- ② Not KEMA-KEUR listed.
- ③ IEC 60947-2 H.5 Annex H is not KEMA-KEUR tested.
- ④ Not suitable for DC application. Four-pole ground fault not available.
- ⑤ Available only on Digitrip 610 and 910 trip units.

## General Specifications

### All Series G Frames

	EG		JG		LG		NG		RG	
Maximum rated current $I_n$ depending on the version	160A <sup>①</sup>		250A		400, 630A <sup>②</sup>		800, 1200, 1600A <sup>③</sup>		1600, 2000, 2500A	
Rated insulation voltage U, according to IEC 60947-2										
Main conducting paths	500 Vac		750 Vac		750 Vac		750 Vac		750 Vac	
Auxiliary circuits	500 Vac		690 Vac		690 Vac		690 Vac		690 Vac	
Rated impulse withstand voltage $U_{imp}$										
Main conducting paths	6 kV		8 kV		8 kV		8 kV		8 kV	
Auxiliary circuits	4 kV		4 kV		4 kV		4 kV		4 kV	
Rated operational voltage $U_e$										
IEC	415 Vac		690 Vac		690 Vac		690 Vac		690 Vac	
NEMA	600Y/347 Vac		600 Vac		600 Vac		600 Vac		600 Vac	
UL and CSA listed	Yes <sup>①</sup>		Yes		Yes <sup>②</sup>		Yes <sup>③</sup>		Yes	
Permissible ambient temperature	-20° to 70°C		-20° to 70°C		-20° to 70°C		-20° to 70°C		-20° to 70°C	
Permissible load for various ambient temperatures close to the circuit breaker, related to the rated current of the circuit breaker	<sup>④</sup> <sup>⑤</sup>		<sup>④</sup> <sup>⑤</sup>		<sup>④</sup> <sup>⑤</sup>		—		—	
Circuit breakers for plant protection										
At 40°C	100%		100%		100%		100%		100%	
At 50°C	96%		92%		96%		91%		91%	
At 55°C	93%		87%		94%		86%		85%	
At 60°C	91%		83%		92%		82%		81%	
At 70°C	86%		73%		88%		70%		70%	
Circuit breakers for motor protection										
At 40°C	—		100%		100%		—		—	
At 50°C	—		100%		100%		—		—	
At 55°C	—		100%		100%		—		—	
At 60°C	—		100%		100%		—		—	
At 70°C	—		90%		90%		—		—	
Circuit breakers for starter combinations and isolating circuit breakers										
At 40°C	100%		100%		100%		100%		100%	
At 50°C	100%		100%		100%		91%		91%	
At 55°C	96%		96%		95%		85%		85%	
At 60°C	91%		82%		90%		81%		81%	
At 70°C	86%		88%		84%		—		—	
Rated short-circuit breaking capacity (DC) Not for circuit breakers for motor protection (Time constant $t = 10$ rms)										
Two conducting paths in series For EG to LG up to 250 Vdc	42 kA max.		42 kA max.		42 kA max.		⑥		⑥	
NEMA (time constant $t = 8$ rms) Two conducting paths in series 250 Vdc	42 kA max.		42 kA max.		42 kA max.		⑥		⑥	

#### Notes

- ① 125 amperes is the maximum UL and CSA rating for the EG.
- ② 630 amperes is not a UL or CSA listed rating. 600 amperes is the maximum UL and CSA rating for the LG.
- ③ 1200 amperes is the maximum UL and CSA rating for the NG.
- ④ Thermal overload release set to the lower value.
- ⑤ Thermal overload release set to the upper value.
- ⑥ Not suitable for DC switching.

# 2.2

## Molded Case Circuit Breakers

### Series G

#### All Series G Frames, continued

2

	EG	JG	LG	NG	RG	
Main switch characteristics according to IEC 60947-2 in combination with lockable rotary drives	Yes	Yes	Yes	Yes	Yes	
Rated short circuit breaking capacity according to IEC 60947-2 (at AC 50/60 Hz)	For rated short circuit breaking capacity, see <b>Page V4-T2-9</b> .					
Endurance (operating cycles)	10,000	10,000	8,000	3,000	3,000	
Maximum switching frequency	300 1/h	240 1/h	240 1/h	60 1/h	60 1/h	
Conductor cross sections and terminal types for main conductors	Box terminals	Box terminals	Box terminals	Flat bar terminals	Flat bar terminals	Flat bar terminals
Solid or stranded	2.5 to 95 mm <sup>2</sup>	50 to 150 mm <sup>2</sup>	95 to 240 mm <sup>2</sup>	—	—	—
Finely stranded with end sleeve	2.5 to 50/70 mm <sup>2</sup>	35 to 120 mm <sup>2</sup>	70 to 150 mm <sup>2</sup>	—	—	—
Busbar	—	—	—	600A	Optional	Optional
Tightening torque for box terminals	5.6 Nm	20 Nm	42 Nm	31 Nm	31 Nm	—
Tightening torque for busbar connection pieces	5.6 Nm	15 Nm	30 Nm	6 Nm	50 Nm	20 Nm
Conductor cross sections for auxiliary circuits with terminal connection or terminal strip						
Solid	0.75 to 2.5 mm <sup>2</sup>	0.75 to 2.5 mm <sup>2</sup>	0.75 to 2.5 mm <sup>2</sup>	Up to 2x4 mm <sup>2</sup>	Up to 2x4 mm <sup>2</sup>	
Finely stranded with end sleeve	0.75 to 2.5 mm <sup>2</sup>	0.75 to 2.5 mm <sup>2</sup>	0.75 to 2.5 mm <sup>2</sup>	Up to 2x2.5 mm <sup>2</sup>	Up to 2x2.5 mm <sup>2</sup>	
With brought-out cable ends	—	0.82 (AWG 18) mm <sup>2</sup>	0.82 (AWG 18) mm <sup>2</sup>	0.82 (AWG 18) mm <sup>2</sup>	0.82 (AWG 18) mm <sup>2</sup>	
Tightening torque for fitting screws	—	0.8 to 1.4 Nm	0.8 to 1.4 Nm	0.8 to 1.4 Nm	0.8 to 1.4 Nm	
Power loss per circuit breaker at maximum rated current I <sub>n</sub> (the power losses of the undervoltage releases ("r" releases) must be observed if necessary) at three-phase symmetrical load)						
			<b>400A:</b>	<b>600A:</b>		
For plant protection	40W	45W	65W	120W	87/210W	220/270/400W
As isolating circuit breaker	40W	45W	65W	120W	87/210W	220/270/400W
For starter combinations	40W	45W	65W	120W	—	—
For motor protection	—	45W	65W	120W	—	—
Permissible mounting position						
Arc spacing— suitable for reverse-feed applications	Yes (except HMCPE)	Yes	Yes	Yes	Yes	
<b>Auxiliary Switches</b>						
Rated thermal current I <sub>th</sub>	6A	6A	6A	6A	6A	
Rated making capacity	20A	20A	20A	20A	20A	
	<b>AC-14</b>	<b>AC-14</b>	<b>AC-14</b>	<b>AC-15</b>	<b>AC-15</b>	
Rated operational voltage	230/400/600V	230/400/600V	230/400/600V	600V	600V	
Rated operational current	6/3/0.25A	6/3/0.25A	6/3/0.25A	6A	6A	
				<b>DC-13</b>	<b>DC-13</b>	
Rated operational voltage	125/250V	125/250V	125/250V	125/250V	125/250V	
Rated operational current	0.5/0.15A	0.5/0.15A	0.5/0.15A	0.5/0.25A	0.5/0.25A	
Backup fuse	6/4/4A	(4) 6/4/4A	(4) 6/4/4A	(4) 6/4/4A	(4) 6/4/4A	
Miniature circuit breaker	6/4A	6/4A	6/4A	6/4A	6/4A	

## All Series G Frames, continued

	EG	JG	LG	NG	RG
<b>Releases</b>					
Undervoltage releases ("r" releases)					
Response voltage:					
Drop (breaker tripped) $U_s$	35–70%	35–70%	35–70%	35–70%	35–70%
Pickup (breaker may be switched on) $U_s$	85–110%	85–110%	85–110%	85–110%	85–110%
Power consumption in continuous operation at:					
50/60 Hz 12 Vac	—	—	—	1.9 VA	2.9 VA
50/60 Hz 24 Vac	0.72 VA	3.9 VA	3.9 VA	2.4 VA	3.1 VA
50/60 Hz 48–60 Vac	1.15–1.78 VA	2.5–3.8 VA	2.5–3.8 VA	2.3–4.1 VA	3.4–6.0 VA
50/60 Hz 110–127 Vac	0.96–1.25 VA	1.8–2.4 VA	1.8–2.4 VA	3.4–4.2 VA	3.3–3.8 VA
50/60 Hz 208–240 Vac	1.28–1.68 VA	2.7–3.8 VA	2.7–3.8 VA	4.8–6.5 VA	4.2–7.2 VA
50/60 Hz 380–500 Vac	2.2–3.9 VA	3.4–5.8 VA	3.4–5.8 VA	6.8–12.0 VA	3.8–10.0 VA
50/60 Hz 525–600 Vac	3.4–4.3 VA	3.4–4.3 VA	3.4–4.3 VA	—	—
12 Vdc	—	—	—	2.6W	3.4W
24 Vdc	0.70W	3.1W	3.1W	3.6W	4.3W
48–60 Vdc	1.12–1.76W	2.0–3.1W	2.0–3.1W	3.5–5.5W	4.8–7.2W
110–125 Vdc	0.94–1.21W	1.6–2.2W	1.6–2.2W	2.9–3.6W	3.3–3.8W
220–250 Vdc	1.45–1.86W	3.1–4W	3.1–4W	4.8–6.3W	6.6–7.5W
Maximum opening time	50 ms	50 ms	50 ms	62 ms	62 ms
<b>Shunt Trips</b>					
Shunt trips ("f" releases)					
Response voltage:					
Pickup (breaker tripped) $U_s$	70–110%	70–110%	70–110%	70–110%	70–110%
Power consumption in (short time) at:					
50/60 Hz 24 Vac	10–41 VA	87–405 VA	87–405 VA	98–475 VA	612 VA
50/60 Hz 48–60 Vac	139–210 VA	710–1105 VA	710–1105 VA	24–50 VA	403–666 VA
50/60 Hz 48–127 Vac	—	—	—	—	—
50/60 Hz 110–240 Vac	83–360 VA	66–432 VA	66–432 VA	67–432 VA	396–1896 VA
50/60 Hz 380–440 Vac	—	127–188 VA	127–188 VA	76–110 VA	1596–2156 VA
50/60 Hz 380–600 Vac	418–1080 VA	—	—	—	—
50/60 Hz 480–600 Vac	—	34–60 VA	34–60 VA	19–42 VA	230–384 VA
12–24 Vdc	29–120W	164–631W	164–631W	145–610W	396W
48–60 Vdc	475–720W	830–1580W	830–1580W	67–102W	341–528W
110–125 Vdc	99–121W	112–150W	112–150W	121–150W	264–350W
220–250 Vdc	—	40–58W	40–58W	46–55W	374–475W
Maximum load duration	Interrupts automatically	Interrupts automatically	Interrupts automatically	Interrupts automatically	Interrupts automatically
Maximum opening time	50 ms	50 ms	50 ms	62 ms	62 ms
<b>Molded Case Switch (with High Magnetic Trip)</b>					
Unfused kAIC at 480 Vac (415 Vac)	65 (70)	65 (70)	65 (70)	65 (70)	65 (70)
Self-protected, will trip above	1250 for EG125; 1600 for EG160	2500	4000/6300	12,500	20,000



# 2.2

## Molded Case Circuit Breakers

### Series G

#### Dimensions and Weights

Approximate Dimensions in Inches (mm)

2

##### Series G—Frame EG, JG and LG

	EG			JG			LG		
	H	W	D	H	W	D	H	W	D
<b>Single-pole</b>	5.50 (139.7)	1.00 (25.4)	2.99 (76.0)	—	—	—	—	—	—
<b>Two-pole</b>	5.50 (139.7)	2.00 (50.8)	2.99 (76.0)	7.00 (177.8)	4.13 (105.0)	3.57 (87.4)	—	—	—
<b>Three-pole</b>	5.50 (139.7)	3.00 (76.2)	2.99 (76.0)	7.00 (177.8)	4.13 (105.0)	3.57 (87.4)	10.13 (258.0)	5.48 (140.0)	4.09 (104.0)
<b>Four-pole</b>	5.50 (139.7)	4.00 (101.6)	2.99 (76.0)	7.00 (177.8)	5.34 (135.6)	3.57 (87.4)	10.13 (258.0)	7.22 (183.0)	4.09 (104.0)

##### Series G—Frame NG and RG

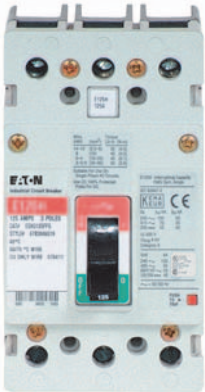
	NG			RG		
	H	W	D	H	W	D
<b>Single-pole</b>	—	—	—	—	—	—
<b>Two-pole</b>	—	—	—	—	—	—
<b>Three-pole</b>	16.00 (406.0)	8.25 (210.0)	5.50 (140.0)	16.00 (406.0)	15.50 (394.0)	9.75 (229.0)
<b>Four-pole</b>	16.00 (406.0)	11.13 (280.0)	5.50 (140.0)	16.00 (406.0)	20.00 (508.0)	9.75 (229.0)

Approximate Shipping Weight in Lbs (kg)

##### Series G—Frame EG, JG and LG

	EG	JG	LG	NG	RG
<b>Single-pole</b>	0.85 (0.39)	—	—	—	—
<b>Two-pole</b>	1.57 (0.71)	11.3 (5.13)	—	—	—
<b>Three-pole</b>	2.28 (1.04)	5.06 (2.30) T/M 5.31 (2.41) ETU	12.36 (5.61) T/M 13.04 (5.92) ETU	46.8 (21.3)	103.0 (47.0)
<b>Four-pole</b>	2.85 (1.29)	6.76 (3.07) T/M 7.12 (3.23) ETU	16.27 (7.39) T/M 16.92 (7.68) ETU	62.0 (28.3)	118.4 (54.0)

**EG-Frame (15–125 Amperes)**



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EG-Frame (15–125 Amperes)	
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Product Selection . . . . .	<b>V4-T2-17</b>
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LG-Frame (250–630 Amperes) . . . . .	<b>V4-T2-45</b>
NG-Frame (320–1200 Amperes) . . . . .	<b>V4-T2-61</b>
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Motor Circuit Protectors (MCP) . . . . .	<b>V4-T2-80</b>
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30 mA Ground Fault (Earth Leakage) Module . . . . .	<b>V4-T2-87</b>
Current Limiting Circuit Breaker Module . . . . .	<b>V4-T2-91</b>
High Instantaneous Circuit Breaker for Selective Coordination. . . . .	<b>V4-T2-96</b>
Special Features and Accessories . . . . .	<b>V4-T2-99</b>
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Plug-In Blocks . . . . .	<b>V4-T2-108</b>
Drawout Cassette . . . . .	<b>V4-T2-109</b>

**EG-Frame (15–125 Amperes)**

**Product Description**

EG breaker is HACR rated.

# 2.2

## Molded Case Circuit Breakers

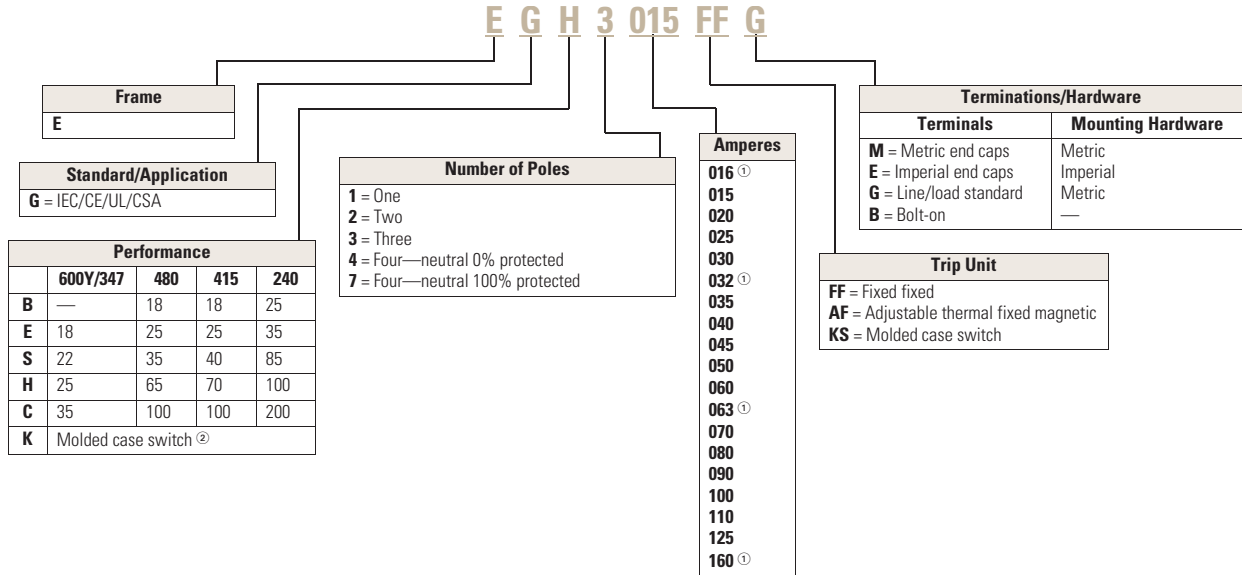
### Series G

#### Catalog Number Selection

This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

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#### Series G—EG-Frame (15–125 Amperes)



#### Notes

- ① Cannot be UL rated.
- ② Available only as 125 and 160A sizes.

**Product Selection**

**Complete Breaker (Includes Frame, Trip Unit, Standard Terminals and Mounting Hardware) IC Rating at 415/480 Volts**

EG-Frame



**EG-Frame — 18/18**

Maximum Continuous Amps at 40°C ①	Single-Pole	Two-Pole	Three-Pole	Adjustable ② Thermal, Fixed Magnetic Catalog Number	Four-Pole ③	Adjustable ② Thermal, Fixed Magnetic Catalog Number
	Fixed Thermal, Fixed Magnetic Catalog Number	Fixed Thermal, Fixed Magnetic Catalog Number	Fixed Thermal, Fixed Magnetic Catalog Number		Fixed Thermal, Fixed Magnetic Catalog Number	
15	EGB1015FFG	EGB2015FFG	EGB3015FFG	—	EGB4015FFG	—
16	EGB1016FFG	EGB2016FFG	EGB3016FFG	—	EGB4016FFG	—
20	EGB1020FFG	EGB2020FFG	EGB3020FFG	—	EGB4020FFG	EGB4020AFG
25	EGB1025FFG	EGB2025FFG	EGB3025FFG	EGB3025AFG	EGB4025FFG	EGB4025AFG
30	EGB1030FFG	EGB2030FFG	EGB3030FFG	—	EGB4030FFG	—
32	EGB1032FFG	EGB2032FFG	EGB3032FFG	EGB3032AFG	EGB4032FFG	EGB4032AFG
35	EGB1035FFG	EGB2035FFG	EGB3035FFG	—	EGB4035FFG	—
40	EGB1040FFG	EGB2040FFG	EGB3040FFG	EGB3040AFG	EGB4040FFG	EGB4040AFG
45	EGB1045FFG	EGB2045FFG	EGB3045FFG	—	EGB4045FFG	—
50	EGB1050FFG	EGB2050FFG	EGB3050FFG	EGB3050AFG	EGB4050FFG	EGB4050AFG
60	EGB1060FFG	EGB2060FFG	EGB3060FFG	—	EGB4060FFG	—
63	EGB1063FFG	EGB2063FFG	EGB3063FFG	EGB3063AFG	EGB4063FFG	EGB4063AFG
70	EGB1070FFG	EGB2070FFG	EGB3070FFG	—	EGB4070FFG	—
80	EGB1080FFG	EGB2080FFG	EGB3080FFG	EGB3080AFG	EGB4080FFG	EGB4080AFG
90	EGB1090FFG	EGB2090FFG	EGB3090FFG	—	EGB4090FFG	—
100	EGB1100FFG	EGB2100FFG	EGB3100FFG	EGB3100AFG	EGB4100FFG	EGB4100AFG
125	EGB1125FFG	EGB2125FFG	EGB3125FFG	EGB3125AFG	EGB4125FFG	EGB4125AFG
160	—	—	EGB3160FFG	EGB3160AFG	EGB4160FFG	EGB4160AFG

**Notes**

- ① 16, 32, 63 and 160A are not UL listed ratings.
- ② Adjustable thermal are not UL listed.
- ③ Change the fourth digit to 7 for 100% neutral protection. Neutral is on the LH side.



# 2.2

## Molded Case Circuit Breakers

### Series G

EG-Frame—25/25 Single-Pole Unavailable

2

EG-Frame



#### EG-Frame—25/25

Maximum Continuous Amps at 40°C <sup>①</sup>	Two-Pole	Three-Pole	Adjustable <sup>②</sup> Thermal, Fixed Magnetic	Four-Pole <sup>③</sup>	Adjustable <sup>②</sup> Thermal, Fixed Magnetic
	Fixed Thermal, Fixed Magnetic Catalog Number	Fixed Thermal, Fixed Magnetic Catalog Number	Fixed Thermal, Fixed Magnetic Catalog Number	Fixed Thermal, Fixed Magnetic Catalog Number	Fixed Thermal, Fixed Magnetic Catalog Number
15	EGE2015FFG	EGE3015FFG	—	EGE4015FFG	—
16	EGE2016FFG	EGE3016FFG	—	EGE4016FFG	—
20	EGE2020FFG	EGE3020FFG	—	EGE4020FFG	EGE4020AFG
25	EGE2025FFG	EGE3025FFG	EGE3025AFG	EGE4025FFG	EGE4025AFG
30	EGE2030FFG	EGE3030FFG	—	EGE4030FFG	—
32	EGE2032FFG	EGE3032FFG	EGE3032AFG	EGE4032FFG	EGE4032AFG
35	EGE2035FFG	EGE3035FFG	—	EGE4035FFG	—
40	EGE2040FFG	EGE3040FFG	EGE3040AFG	EGE4040FFG	EGE4040AFG
45	EGE2045FFG	EGE3045FFG	EGE3050AFG	EGE4045FFG	—
50	EGE2050FFG	EGE3050FFG	—	EGE4050FFG	EGE4050AFG
60	EGE2060FFG	EGE3060FFG	—	EGE4060FFG	—
63	EGE2063FFG	EGE3063FFG	EGE3063AFG	EGE4063FFG	EGE4063AFG
70	EGE2070FFG	EGE3070FFG	—	EGE4070FFG	—
80	EGE2080FFG	EGE3080FFG	EGE3080AFG	EGE4080FFG	EGE4080AFG
90	EGE2090FFG	EGE3090FFG	—	EGE4090FFG	—
100	EGE2100FFG	EGE3100FFG	EGE3100AFG	EGE4100FFG	EGE4100AFG
125	EGE2125FFG	EGE3125FFG	EGE3125AFG	EGE4125FFG	EGE4125AFG
160	—	EGE3160FFG	EGE3160AFG	EGE4160FFG	EGE4160AFG

#### Notes

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- ② Adjustable thermal are not UL listed.
- ③ Change the fourth digit to 7 for 100% neutral protection. Neutral is on the LH side.

EG-Frame



EG-Frame—40/35

Maximum Continuous Amps at 40°C ①	Single-Pole	Two-Pole	Three-Pole	Adjustable ② Thermal, Fixed Magnetic Catalog Number	Four-Pole ③	Adjustable ② Thermal, Fixed Magnetic Catalog Number
	Fixed Thermal, Fixed Magnetic Catalog Number	Fixed Thermal, Fixed Magnetic Catalog Number	Fixed Thermal, Fixed Magnetic Catalog Number		Fixed Thermal, Fixed Magnetic Catalog Number	
15	EGS1015FFG	EGS2015FFG	EGS3015FFG	—	EGS4015FFG	—
16	EGS1016FFG	EGS2016FFG	EGS3016FFG	—	EGS4016FFG	—
20	EGS1020FFG	EGS2020FFG	EGS3020FFG	—	EGS4020FFG	EGS4020AFG
25	EGS1025FFG	EGS2025FFG	EGS3025FFG	EGS3025AFG	EGS4025FFG	EGS4025AFG
30	EGS1030FFG	EGS2030FFG	EGS3030FFG	—	EGS4030FFG	—
32	EGS1032FFG	EGS2032FFG	EGS3032FFG	EGS3032AFG	EGS4032FFG	EGS4032AFG
35	EGS1035FFG	EGS2035FFG	EGS3035FFG	—	EGS4035FFG	—
40	EGS1040FFG	EGS2040FFG	EGS3040FFG	EGS3040AFG	EGS4040FFG	EGS4040AFG
45	EGS1045FFG	EGS2045FFG	EGS3045FFG	—	EGS4045FFG	—
50	EGS1050FFG	EGS2050FFG	EGS3050FFG	EGS3050AFG	EGS4050FFG	EGS4050AFG
60	EGS1060FFG	EGS2060FFG	EGS3060FFG	—	EGS4060FFG	—
63	EGS1063FFG	EGS2063FFG	EGS3063FFG	EGS3063AFG	EGS4063FFG	EGS4063AFG
70	EGS1070FFG	EGS2070FFG	EGS3070FFG	—	EGS4070FFG	—
80	EGS1080FFG	EGS2080FFG	EGS3080FFG	EGS3080AFG	EGS4080FFG	EGS4080AFG
90	EGS1090FFG	EGS2090FFG	EGS3090FFG	—	EGS4090FFG	—
100	EGS1100FFG	EGS2100FFG	EGS3100FFG	EGS3100AFG	EGS4100FFG	EGS4100AFG
125	EGS1125FFG	EGS2125FFG	EGS3125FFG	EGS3125AFG	EGS4125FFG	EGS4125AFG
160	—	—	EGS3160FFG	EGS3160AFG	EGS4160FFG	EGS4160AFG

Notes

- ① 16, 32, 63 and 160A are not UL listed ratings.
- ② Adjustable thermal are not UL listed.
- ③ Change the fourth digit to 7 for 100% neutral protection. Neutral is on the LH side.

# 2.2

## Molded Case Circuit Breakers

### Series G

2

EG-Frame



#### EG-Frame—70/65

Maximum Continuous Amps at 40°C ①	Single-Pole	Two-Pole	Three-Pole	Adjustable ② Thermal, Fixed Magnetic Catalog Number	Four-Pole ③	Adjustable ② Thermal, Fixed Magnetic Catalog Number
	Fixed Thermal, Fixed Magnetic Catalog Number	Fixed Thermal, Fixed Magnetic Catalog Number	Fixed Thermal, Fixed Magnetic Catalog Number		Fixed Thermal, Fixed Magnetic Catalog Number	
15	EGH1015FFG	EGH2015FFG	EGH3015FFG	—	EGH4015FFG	—
16	EGH1016FFG	EGH2016FFG	EGH3016FFG	—	EGH4016FFG	—
20	EGH1020FFG	EGH2020FFG	EGH3020FFG	EGH3020AFG	EGH4020FFG	EGH4020AFG
25	EGH1025FFG	EGH2025FFG	EGH3025FFG	EGH3025AFG	EGH4025FFG	EGH4025AFG
30	EGH1030FFG	EGH2030FFG	EGH3030FFG	—	EGH4030FFG	—
32	EGH1032FFG	EGH2032FFG	EGH3032FFG	EGH3032AFG	EGH4032FFG	EGH4032AFG
35	EGH1035FFG	EGH2035FFG	EGH3035FFG	—	EGH4035FFG	—
40	EGH1040FFG	EGH2040FFG	EGH3040FFG	EGH3040AFG	EGH4040FFG	EGH4040AFG
45	EGH1045FFG	EGH2045FFG	EGH3045FFG	—	EGH4045FFG	EGH4050AFG
50	EGH1050FFG	EGH2050FFG	EGH3050FFG	EGH3050AFG	EGH4050FFG	—
60	EGH1060FFG	EGH2060FFG	EGH3060FFG	—	EGH4060FFG	—
63	EGH1063FFG	EGH2063FFG	EGH3063FFG	EGH3063AFG	EGH4063FFG	EGH4063AFG
70	EGH1070FFG	EGH2070FFG	EGH3070FFG	—	EGH4070FFG	—
80	EGH1080FFG	EGH2080FFG	EGH3080FFG	EGH3080AFG	EGH4080FFG	EGH4080AFG
90	EGH1090FFG	EGH2090FFG	EGH3090FFG	—	EGH4090FFG	—
100	EGH1100FFG	EGH2100FFG	EGH3100FFG	EGH3100AFG	EGH4100FFG	EGH4100AFG
125	EGH1125FFG	EGH2125FFG	EGH3125FFG	EGH3125AFG	EGH4125FFG	EGH4125AFG

**Notes**

- ① 16, 32, 63A are not UL listed ratings.
- ② Adjustable thermal are not UL listed.
- ③ Change the fourth digit to 7 for 100% neutral protection. Neutral is on the LH side.

EG-Frame—100/100 Current Limiting (Single-Pole and Two-Pole Unavailable)

## EG-Frame



## EG-Frame—100/100

Maximum Continuous Amps at 40°C <sup>①</sup>	Three-Pole Fixed Thermal, Fixed Magnetic		Four-Pole 0% Protected Neutral <sup>③</sup>	
	Catalog Number	Adjustable <sup>②</sup> Thermal, Fixed Magnetic Catalog Number	Catalog Number	Adjustable <sup>②</sup> Thermal, Fixed Magnetic Catalog Number
15	EGC3015FFG	—	EGC7015FFG	—
16	EGC3016FFG	—	EGC7016FFG	—
20	EGC3020FFG	EGC3020AFG	EGC7020FFG	EGC7020AFG
25	EGC3025FFG	EGC3025AFG	EGC7025FFG	EGC7025AFG
30	EGC3030FFG	—	EGC7030FFG	—
32	EGC3032FFG	EGC3032AFG	EGC7032FFG	EGC7032AFG
35	EGC3035FFG	—	EGC7035FFG	—
40	EGC3040FFG	EGC3040AFG	EGC7040FFG	EGC7040AFG
45	EGC3045FFG	—	EGC7045FFG	—
50	EGC3050FFG	EGC3050AFG	EGC7050FFG	EGC7050AFG
60	EGC3060FFG	—	EGC7060FFG	—
63	EGC3063FFG	EGC3063AFG	EGC7063FFG	EGC7063AFG
70	EGC3070FFG	—	EGC7070FFG	—
80	EGC3080FFG	EGC3080AFG	EGC7080FFG	EGC7080AFG
90	EGC3090FFG	—	EGC7090FFG	—
100	EGC3100FFG	EGC3100AFG	EGC7100FFG	EGC7100AFG
125	EGC3125FFG	EGC3125AFG	EGC7125FFG	EGC7125AFG

Molded Case Switches <sup>④</sup>Catalog  
Number

EGK3125KSG

EGK7125KSG

EGK3160KSG

EGK7160KSG

## Notes

- ① 16, 32, 63A are not UL listed ratings.
- ② Adjustable thermal is not UL listed.
- ③ Change the fourth digit to 7 for 100% neutral protection. Neutral is on LH side.
- ④ Molded case switches may open above 1250A.

**EG Bolt-On Complete Breaker (Includes Frame, Trip Unit and Mounting Hardware)**

2

**EG-Frame****EG-Frame—18 kAIC at 480 Vac**

Maximum Continuous Amps at 40°C	Single-Pole Fixed Thermal, Fixed Magnetic Catalog Number <sup>①</sup>	Two-Pole Fixed Thermal, Fixed Magnetic Catalog Number <sup>②</sup>	Three-Pole Fixed Thermal, Fixed Magnetic Catalog Number <sup>③</sup>
15	EGB1015FFB	EGB2015FFB	EGB3015FFB
20	EGB1020FFB	EGB2020FFB	EGB3020FFB
25	EGB1025FFB	EGB2025FFB	EGB3025FFB
30	EGB1030FFB	EGB2030FFB	EGB3030FFB
35	EGB1035FFB	EGB2035FFB	EGB3035FFB
40	EGB1040FFB	EGB2040FFB	EGB3040FFB
45	EGB1045FFB	EGB2045FFB	EGB3045FFB
50	EGB1050FFB	EGB2050FFB	EGB3050FFB
60	EGB1060FFB	EGB2060FFB	EGB3060FFB
70	EGB1070FFB	EGB2070FFB	EGB3070FFB
80	EGB1080FFB	EGB2080FFB	EGB3080FFB
90	EGB1090FFB	EGB2090FFB	EGB3090FFB
100	EGB1100FFB	EGB2100FFB	EGB3100FFB
110	EGB1110FFB	EGB2110FFB	EGB3110FFB
125	EGB1125FFB	EGB2125FFB	EGB3125FFB

**EG-Frame****EG-Frame—35 kAIC at 480 Vac**

Maximum Continuous Amps at 40°C	Single-Pole Fixed Thermal, Fixed Magnetic Catalog Number <sup>①</sup>	Two-Pole Fixed Thermal, Fixed Magnetic Catalog Number <sup>②</sup>	Three-Pole Fixed Thermal, Fixed Magnetic Catalog Number <sup>③</sup>
15	EGS1015FFB	EGS2015FFB	EGS3015FFB
20	EGS1020FFB	EGS2020FFB	EGS3020FFB
25	EGS1025FFB	EGS2025FFB	EGS3025FFB
30	EGS1030FFB	EGS2030FFB	EGS3030FFB
35	EGS1035FFB	EGS2035FFB	EGS3035FFB
40	EGS1040FFB	EGS2040FFB	EGS3040FFB
45	EGS1045FFB	EGS2045FFB	EGS3045FFB
50	EGS1050FFB	EGS2050FFB	EGS3050FFB
60	EGS1060FFB	EGS2060FFB	EGS3060FFB
70	EGS1070FFB	EGS2070FFB	EGS3070FFB
80	EGS1080FFB	EGS2080FFB	EGS3080FFB
90	EGS1090FFB	EGS2090FFB	EGS3090FFB
100	EGS1100FFB	EGS2100FFB	EGS3100FFB
110	EGS1110FFB	EGS2110FFB	EGS3110FFB
125	EGS1125FFB	EGS2125FFB	EGS3125FFB

**Notes**

- ① For bulk pack 24, add suffix BP24 and order quantities of 24.
- ② For bulk pack 12, add suffix BP12 and order quantities of 12.
- ③ For bulk pack 8, add suffix BP8 and order quantities of 8.

## EG-Frame



## EG-Frame—65 kAIC at 480 Vac

Maximum Continuous Amps at 40°C	Single-Pole Fixed Thermal, Fixed Magnetic Catalog Number <sup>①</sup>	Two-Pole Fixed Thermal, Fixed Magnetic Catalog Number <sup>②</sup>	Three-Pole Fixed Thermal, Fixed Magnetic Catalog Number <sup>③</sup>
15	EGH1015FFB	EGH2015FFB	EGH3015FFB
20	EGH1020FFB	EGH2020FFB	EGH3020FFB
25	EGH1025FFB	EGH2025FFB	EGH3025FFB
30	EGH1030FFB	EGH2030FFB	EGH3030FFB
35	EGH1035FFB	EGH2035FFB	EGH3035FFB
40	EGH1040FFB	EGH2040FFB	EGH3040FFB
45	EGH1045FFB	EGH2045FFB	EGH3045FFB
50	EGH1050FFB	EGH2050FFB	EGH3050FFB
60	EGH1060FFB	EGH2060FFB	EGH3060FFB
70	EGH1070FFB	EGH2070FFB	EGH3070FFB
80	EGH1080FFB	EGH2080FFB	EGH3080FFB
90	EGH1090FFB	EGH2090FFB	EGH3090FFB
100	EGH1100FFB	EGH2100FFB	EGH3100FFB
110	EGH1110FFB	EGH2110FFB	EGH3110FFB
125	EGH1125FFB	EGH2125FFB	EGH3125FFB

## Load Terminals

Maximum Breaker Amps	Terminal, Body Material	Wire Type	Metric Wire Range mm <sup>2</sup>	AWG Wire Range	(Package of Three Terminals) Catalog Number
<b>Standard Cu/Al Pressure Type Terminals</b>					
15–50	Aluminum	Cu/Al	2.5–50	#14–1/0	3TA125EF
60–125	Aluminum	Cu/Al	16–70	#6–3/0	3TA150EF

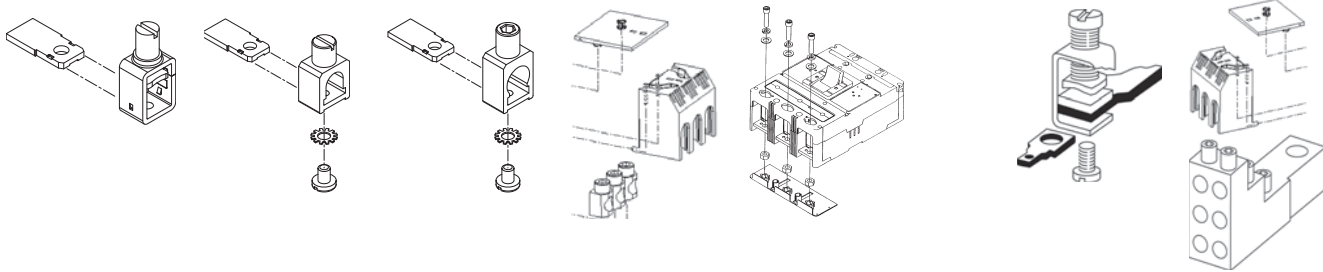
**Notes**

- ① For bulk pack 24, add suffix BP24 and order quantities of 24.
- ② For bulk pack 12, add suffix BP12 and order quantities of 12.
- ③ For bulk pack 8, add suffix BP8 and order quantities of 8.

#### Accessories Selection Guide and Ordering Information

##### EG-Frame

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3T125EF	3TA125EF	3TA150EF	3TA160EFK	EF2RTWK, Two-Pole–Metric EF3RTWK, Three-Pole–Metric EF4RTWK, Four-Pole–Metric EF2RTDK, Two-Pole–Imperial EF3RTDK, Three-Pole–Imperial EF4RTDK, Four-Pole–Imperial	Control Wire Terminal Kit GCWTK	Multiwire Connectors
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#### Line and Load Terminals

Maximum Breaker Amps	Terminal Body Material	Wire Type	Metric Wire Range mm <sup>2</sup>	AWG Wire Range	(Package of Three Terminals) Catalog Number
<b>Standard Cu/Al Pressure Type Terminals</b>					
125	Steel	Al	4–6	#12-10	3T125EF ①
125	Steel	Cu	2.5–95	#14-3/0	3T125EF ①
125	Aluminum	Cu/Al	2.5–50	#14-1/0	3TA125EF
160	Aluminum	Cu/Al	16–70	#6-3/0	3TA150EF
160	Aluminum	Cu/Al	35–120	#3-250	3TA160EFK
160	Aluminum	Cu/Al	35–120	#3-250	4TA160EFK ②

EG-Frame circuit breakers and molded case switches have line and load terminals as standard equipment.

Insert collar enclosing conductor as shown. Locate nut on top of conductor and tighten securely with screw and washer.

**Caution:** Collar must surround conductor.

Insert collar enclosing conductor and center on extrusion. Tighten securely with screw and washer. Endcap kits are used on the E-Frame breaker line side to connect busbar or similar electrical connections. Includes hardware.

#### Notes

- ① Standard line and load terminals.
- ② Four-pole kit with four terminals.

**Control Wire Terminal Kit**

	Catalog Number
Control wire terminal kit	5652B38G01
Package of 12—priced individually	

For use with steel or stainless steel standard line and load terminals only.

**Interphase Barriers**

	Catalog Number
Interphase barriers	EIPBK
Package of 12—priced individually	

The interphase barrier is available for extended insulation between circuit breaker poles. Specify quantity when ordering.

**Base Mounting Hardware—DIN Rail Mounting**

	Catalog Number
DIN rail adapter—single-pole	EF1DIN
DIN rail adapter—two-pole	EGDIN
DIN rail adapter—three- or four-pole	EF34DIN

Metric base mounting hardware is included with a circuit breaker or molded case switch. (Included with breaker.) If required separately, order S/N 8703C80G08.

**Note:** English mounting hardware kit can be supplied separate. Catalog number is **BMHE #6-32 x 3** inches for two-, three- and four-pole. Single-pole mounting hardware metric order **8703C80G11**. English hardware **8703C80G12**. Both sold in quantities of 100.

**Terminal Shields**

The terminal shield is available for line terminal areas in three- and four-pole circuit breakers. Special terminal shields are also available for use when an electrical (solenoid) operator is mounted on the circuit breaker. The standard style number by pole for each terminal shield is for a package of 10 and is priced per each package. Special terminal shields are packaged individually.

**Terminal Shields—IP30 Protection**

Number of Poles	Catalog Number
3	EFTS3K
4	EFTS4K

**Terminal End Covers (Gas Barrier)**

The terminal end cover is available for three-pole circuit breakers only. Two conductor opening sizes are available. Specify quantity (one per circuit breaker) when ordering.

**Terminal End Covers**

Conductor Opening Diameter Inches (mm)	Catalog Number
6.35 (0.25)	EEC3K
10.41 (0.41)	EEC4K

**Multiwire Connectors**

Field-installed multiwire connectors for the load side (OFF) end terminals. They are used to distribute the load from the circuit breaker to multiple devices without the use of separate distribution terminal blocks.

Multiwire lug kits include mounting hardware, terminal shield insulators and tin-plated aluminum connectors to replace three mechanical load lugs. UL listed as used on the load side (OFF) end.

**EG-Frame Multiwire Connectors Ordering Information (Package of 3) <sup>①</sup>**

Maximum Amperes	Wires per Terminal	Wire Size Range AWG Cu	Kit Catalog Number
125	3	14–2	3TA125E3K
125	6	14–6	3TA125E6K

**Note**

<sup>①</sup> For four-pole kit, change “3” at beginning of catalog number to “4.”



#### Accessories

##### Allowable Accessory Combinations

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

##### EG-Frame Accessories

Description	Reference Page	Single-Pole			Two-Pole			Three-Pole			Four-Pole			Neutral
		Center	Left	Right	Left	Center	Right	Left	Center	Right	Left	Center	Right	
<b>Internal Accessories (Only one internal accessory per pole)</b>														
Alarm lockout (Make/Break)	V4-T2-104	—	—	■	—	—	■	—	—	■	—	—	■	—
Alarm lockout (2Make/2Break)	V4-T2-104	—	—	■	—	—	■	—	—	■	—	—	■	—
Auxiliary switch (1A, 1B)	V4-T2-104	—	—	■	—	—	■	—	—	■	—	—	■	—
Auxiliary switch (2A, 2B)	V4-T2-104	—	—	■	—	—	■	—	—	■	—	—	■	—
Auxiliary switch and alarm switch combination	V4-T2-104	—	—	■	—	—	■	—	—	■	—	—	■	—
Shunt trip—standard	V4-T2-104	—	—	—	■	—	—	■	—	—	—	—	—	—
Undervoltage release mechanism	V4-T2-105	—	—	—	■	—	—	■	—	—	—	—	—	—
<b>External Accessories</b>														
End cap kit	V4-T2-25	—	●	●	●	●	●	●	●	●	●	●	●	●
Control wire terminal kit	V4-T2-25	●	●	●	●	●	●	●	●	●	●	●	●	●
Multewire connectors	V4-T2-25	●	●	●	●	●	●	●	●	●	●	●	●	●
Base mounting hardware	V4-T2-25	●	●	●	●	●	●	●	●	●	●	●	●	●
Terminal shields	V4-T2-25	●	●	●	●	●	●	●	●	●	●	●	●	●
Terminal end covers	V4-T2-25	—	—	—	●	●	●	—	—	—	—	—	—	—
Interphase barriers	V4-T2-25	—	●	●	●	●	●	●	●	●	●	●	●	●
Non-padlockable handle block	V4-T2-102	■	■	—	—	■	—	—	■	—	—	■	—	—
Snap-on padlockable handle lock hasp	V4-T2-102	■	■	—	—	■	—	—	■	—	—	■	—	—
Padlockable handle lock hasp	V4-T2-102	—	—	■	□	—	□	□	—	□	—	□	—	—
Walking beam interlock—requires two breakers	V4-T2-102	—	—	—	●	●	●	●	●	●	●	●	●	●
Plug-in adapters	V4-T2-102	—	●	●	●	●	●	●	●	●	●	●	●	●
Electrical operator	V4-T2-102	—	—	—	●	●	●	—	—	—	—	—	—	—
Handle mechanisms	V4-T2-407	—	—	—	●	●	●	—	—	—	—	—	—	—
<b>Modifications (Refer to Eaton)</b>														
Moisture fungus treatment	V4-T2-100	●	●	●	●	●	●	●	●	●	●	●	●	●
Freeze-tested circuit breakers	—	●	●	●	●	●	●	●	●	●	●	●	●	●
Marine/naval application, UL 489 Supplement SA and SB	—	●	●	●	●	●	●	●	●	●	●	●	●	●

##### Legend

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

**Technical Data and Specifications**

**UL 489/IEC 60947-2 Interrupting Capacity (Symmetrical Amperes) (kA) Ratings**

Circuit Breaker Type	Number of Poles	Volts AC (50/60 Hz)										Volts DC <sup>①</sup>				
		220–240				380–415				690 <sup>②</sup>		125		250 <sup>③④</sup>		
		120	I <sub>cu</sub>	I <sub>cs</sub>	277	347	I <sub>cu</sub>	I <sub>cs</sub>	480	600Y/ 347	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>
EGB125	1	35	25	25	18	—	—	—	—	—	—	—	10	10	—	—
	2, 3, 4	—	25	25	—	—	18	18	18	—	—	—	—	—	10	10
EGE125	2, 3, 4	—	35	35	—	—	25	25	25	18	—	—	—	—	10	10
	1	100	85	43	35	22	—	—	—	—	—	—	35	35	—	—
EGS125	2, 3, 4	—	85	43	—	—	40	30	35	22	—	—	—	—	35	35
	1	200	100	50	65	30	—	—	—	—	—	—	42	42	—	—
EGH125	2, 3, 4	—	100	50	—	—	70	35	65	25	—	—	—	—	42	42
	3, 4	—	200	200	—	—	100	100	100	35	—	—	—	—	42	42
EGB160 <sup>②</sup>	3, 4	—	25	25	—	—	18	18	18	—	—	—	—	—	10	10
	3, 4	—	35	35	—	—	25	25	25	18	—	—	—	—	10	10
EGE160 <sup>②</sup>	3, 4	—	85	43	—	—	40	30	35	22	—	—	—	—	35	35
	3, 4	—	85	43	—	—	40	30	35	22	—	—	—	—	35	35

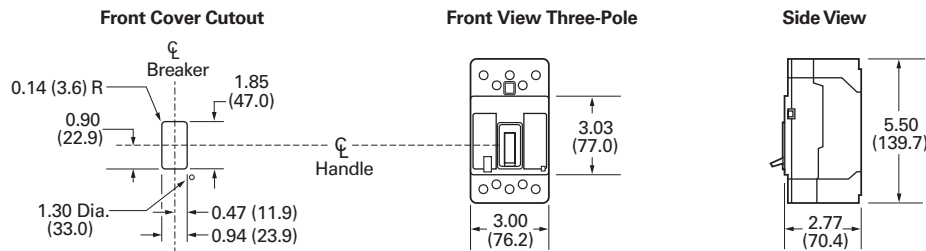
**Dimensions and Weights**

Approximate Dimensions in Inches (mm)

**EG-Frame**

Number of Poles	Width	Height	Depth
1	1.00 (25.4)	5.50 (139.7)	2.99 (75.9)
2	2.00 (50.8)	5.50 (139.7)	2.99 (75.9)
3	3.00 (76.2)	5.50 (139.7)	2.99 (75.9)
4	4.00 (101.6)	5.50 (139.7)	2.99 (75.9)

**EG-Frame**



Approximate Shipping Weight in Lbs (kg)

**EG-Frame**

Breaker Type	Number of Poles				Breaker Type	Number of Poles	
	1	2	3	4		3	4
EGB125	1.5 (0.68)	2.0 (0.91)	3.0 (1.36)	4.9 (1.82)	EGB160	3.0 (1.36)	4.9 (1.82)
EGC125	1.5 (0.68)	2.0 (0.91)	3.0 (1.36)	4.9 (1.82)	EGE160	3.0 (1.36)	4.9 (1.82)
EGE125	1.5 (0.68)	2.0 (0.91)	3.0 (1.36)	4.9 (1.82)	EGS160	3.0 (1.36)	4.9 (1.82)
EGH125	1.5 (0.68)	2.0 (0.91)	3.0 (1.36)	4.9 (1.82)			
EGS125	1.5 (0.68)	2.0 (0.91)	3.0 (1.36)	4.9 (1.82)			

**Notes**

- ① DC ratings apply to substantially non-inductive circuits.
- ② IEC only.
- ③ Two-pole circuit breaker, or two poles of three-pole circuit breaker.
- ④ Time constant is 3 milliseconds minimum at 10 kA and 8 milliseconds minimum at 42 kA.
- ⑤ Current limiting per UL 489.

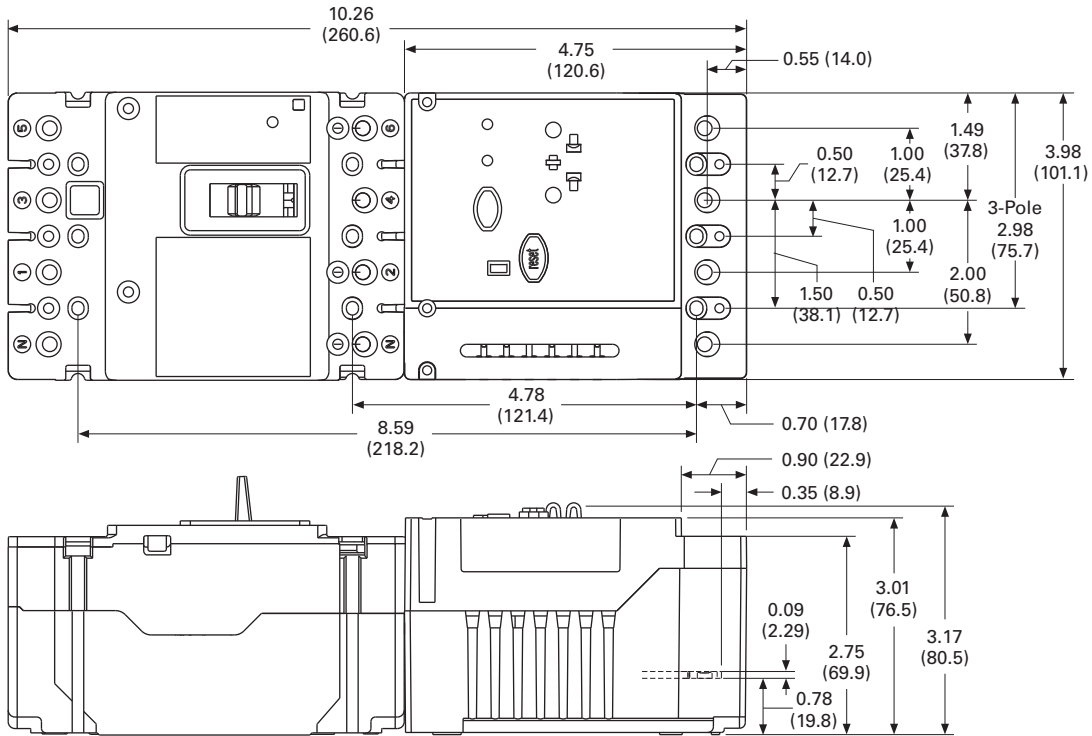
# 2.2

## Molded Case Circuit Breakers

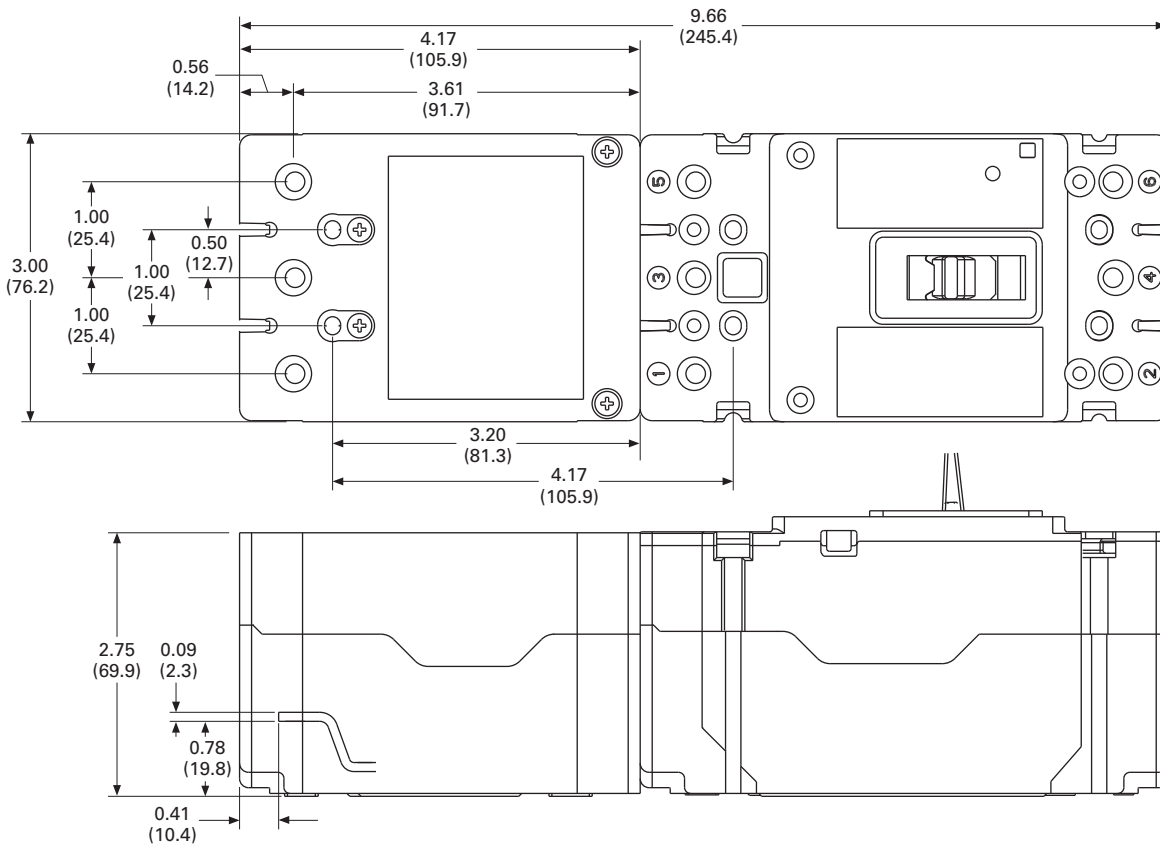
### Series G

#### EG-Frame With Earth Leakage Module

2



#### EG-Frame With Current Limiter Module



**JG-Frame (63–250 Amperes)**



## JG-Frame (63–250 Amperes)

### Product Description

JG breaker is HACR rated.

## Contents

<i>Description</i>	<i>Page</i>
EG-Frame (15–125 Amperes) . . . . .	<b>V4-T2-15</b>
JG-Frame (63–250 Amperes)	
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Product Selection . . . . .	<b>V4-T2-31</b>
Accessories . . . . .	<b>V4-T2-42</b>
Technical Data and Specifications . . . . .	<b>V4-T2-43</b>
Dimensions and Weights . . . . .	<b>V4-T2-43</b>
LG-Frame (250–630 Amperes) . . . . .	<b>V4-T2-45</b>
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RG-Frame (800–2500 Amperes) . . . . .	<b>V4-T2-70</b>
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30 mA Ground Fault (Earth Leakage) Module . . . . .	<b>V4-T2-87</b>
Current Limiting Circuit Breaker Module . . . . .	<b>V4-T2-91</b>
High Instantaneous Circuit Breaker for Selective Coordination. . . . .	<b>V4-T2-96</b>
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Plug-In Blocks . . . . .	<b>V4-T2-108</b>
Drawout Cassette . . . . .	<b>V4-T2-109</b>

# 2.2

## Molded Case Circuit Breakers

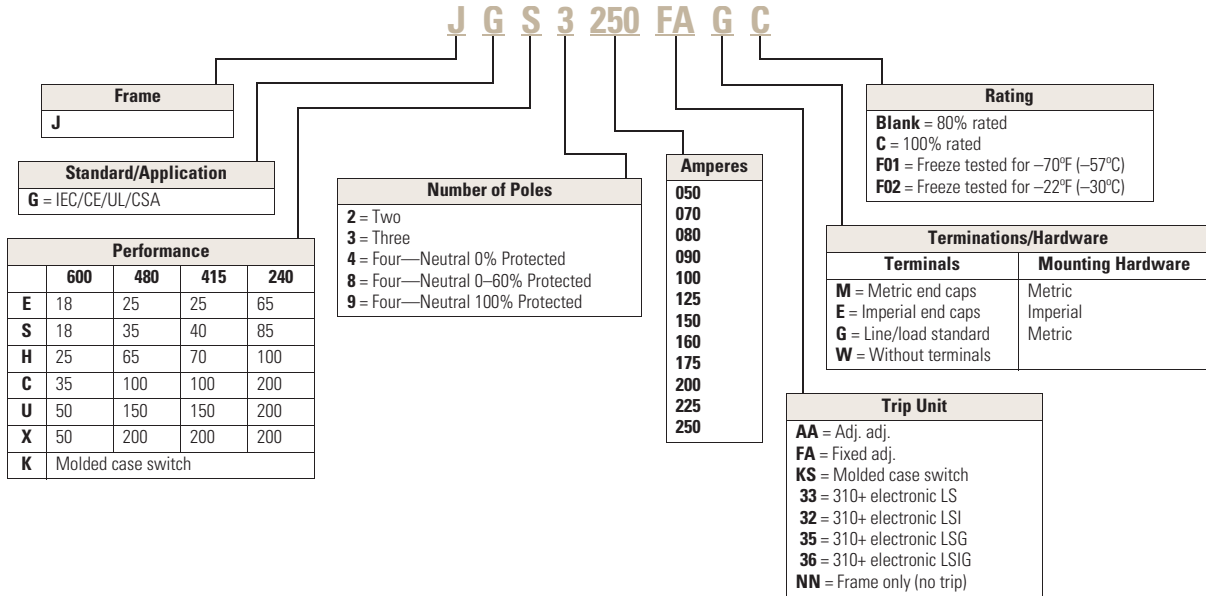
### Series G

#### Catalog Number Selection

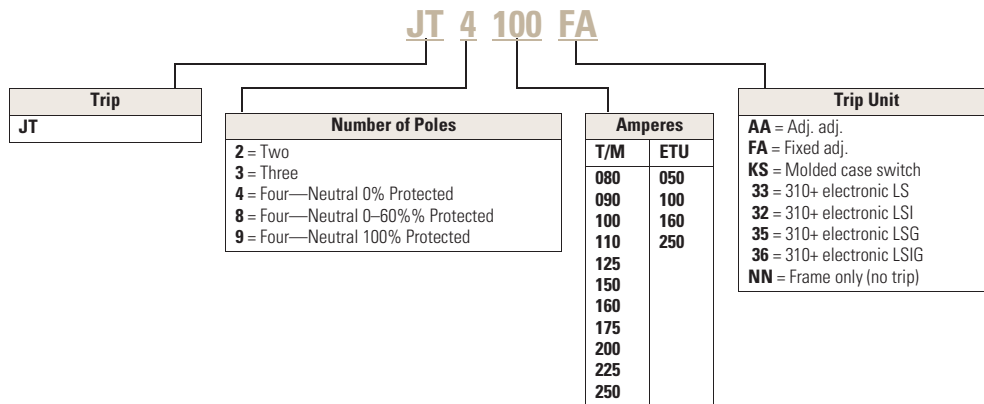
This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

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#### Series G—JG-Frame (63–250 Amperes)



#### Trip Unit



Product Selection

Complete Breaker (Includes Frame, Trip Unit, Standard Terminals and Mounting Hardware)—IC Rating at 415/480 Volts

JG-Frame



JG-Frame—IEC/CE/UL/CSA—25/25

Maximum Continuous Amperes	Magnetic Range	Two-Pole	Three-Pole	Adjustable Thermal, Adjustable Magnetic <sup>①</sup>	Four-Pole 0% <sup>②</sup>	Adjustable Thermal, Adjustable Magnetic <sup>①</sup>
		Fixed Thermal, Adjustable Magnetic Catalog Number	Fixed Thermal, Adjustable Magnetic Catalog Number	Catalog Number	Fixed Thermal, Adjustable Magnetic Catalog Number	Catalog Number
70	350–700	JGE2070FAG	JGE3070FAG	—	JGE4070FAG	—
90	450–900	JGE2090FAG	JGE3090FAG	—	JGE4090FAG	—
100	500–1000	JGE2100FAG	JGE3100FAG	JGE3100AAG	JGE4100FAG	JGE4100AAG
125	625–1250	JGE2125FAG	JGE3125FAG	JGE3125AAG	JGE4125FAG	JGE4125AAG
150	750–1550	JGE2150FAG	JGE3150FAG	—	JGE4150FAG	—
160	800–1600	—	—	JGE3160AAG	—	JGE4160AAG
175	875–1750	JGE2175FAG	JGE3175FAG	—	JGE4175FAG	—
200	1000–2000	JGE2200FAG	JGE3200FAG	JGE3200AAG	JGE4200FAG	JGE4200AAG
225	1125–2250	JGE2225FAG	JGE3225FAG	—	JGE4225FAG	—
250	1250–2500	JGE2250FAG	JGE3250FAG	JGE3250AAG	JGE4250FAG	JGE4250AAG

JG-Frame



JG-Frame—IEC/CE/UL/CSA—40/35, Two-Pole

Maximum Continuous Amperes	Magnetic Range	Two-Pole	Three-Pole	Adjustable Thermal, Adjustable Magnetic <sup>①</sup>	Four-Pole 0% <sup>②</sup>	Adjustable Thermal, Adjustable Magnetic <sup>①</sup>
		Fixed Thermal, Adjustable Magnetic Catalog Number	Fixed Thermal, Adjustable Magnetic Catalog Number	Catalog Number	Fixed Thermal, Adjustable Magnetic Catalog Number	Catalog Number
70	350–700	JGS2070FAG	JGS3070FAG	—	JGS4070FAG	—
90	450–900	JGS2090FAG	JGS3090FAG	—	JGS4090FAG	—
100	500–1000	JGS2100FAG	JGS3100FAG	JGS3100AAG	JGS4100FAG	JGS4100AAG
125	625–1250	JGS2125FAG	JGS3125FAG	JGS3125AAG	JGS4125FAG	JGS4125AAG
150	750–1550	JGS2150FAG	JGS3150FAG	—	JGS4150FAG	—
160	800–1600	—	—	JGS3160AAG	—	JGS4160AAG
175	875–1750	JGS2175FAG	JGS3175FAG	—	JGS4175FAG	—
200	1000–2000	JGS2200FAG	JGS3200FAG	JGS3200AAG	JGS4200FAG	JGS4200AAG
225	1125–2250	JGS2225FAG	JGS3225FAG	—	JGS4225FAG	—
250	1250–2500	JGS2250FAG	JGS3250FAG	JGS3250AAG	JGS4250FAG	JGS4250AAG

Notes

<sup>①</sup> EC-EN 60947-2 only. Adjustment is 0.8 and 1.0.

<sup>②</sup> Change the fourth digit to 8 for adjustable 0–60% neutral protection, 9 for 0–100% neutral protection. Neutral is on LH side.

JG-Frame



JG-Frame—IEC/CE/UL/CSA—70/65

Maximum Continuous Amperes	Magnetic Range	Two-Pole	Three-Pole	Four-Pole 0% <sup>②</sup>		
		Fixed Thermal, Adjustable Magnetic Catalog Number	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Fixed Magnetic <sup>①</sup> Catalog Number	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Fixed Magnetic <sup>①</sup> Catalog Number
70	350–700	JGH2070FAG	JGH3070FAG	—	JGH4070FAG	—
90	450–900	JGH2090FAG	JGH3090FAG	—	JGH4090FAG	—
100	500–1000	JGH2100FAG	JGH3100FAG	JGH3100AAG	JGH4100FAG	JGH4100AAG
125	625–1250	JGH2125FAG	JGH3125FAG	JGH3125AAG	JGH4125FAG	JGH4125AAG
150	750–1550	JGH2150FAG	JGH3150FAG	—	JGH4150FAG	—
160	800–1600	—	—	JGH3160AAG	—	JGH4160AAG
175	875–1750	JGH2175FAG	JGH3175FAG	—	JGH4175FAG	—
200	1000–2000	JGH2200FAG	JGH3200FAG	JGH3200AAG	JGH4200FAG	JGH4200AAG
225	1125–2250	JGH2225FAG	JGH3225FAG	—	JGH4225FAG	—
250	1250–2500	JGH2250FAG	JGH3250FAG	JGH3250AAG	JGH4250FAG	JGH4250AAG

**Notes**

① EC-EN 60947-2 only. Adjustment is 0.8 and 1.0.

② Change the fourth digit to 8 for adjustable 0–60% neutral protection, 9 for 0–100% neutral protection. Neutral is on LH side.

Two-Pole not available in IEC/CE/UL/CSA 100/100, 150/150

#### JG-Frame



#### JG-Frame—IEC/CE/UL/CSA— 100/100, Current Limiting

Maximum Continuous Amperes	Magnetic Range	Three-Pole		Four-Pole 0% <sup>②</sup>	
		Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic <sup>①</sup> Catalog Number	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic <sup>①</sup> Catalog Number
70	350–700	JGC3070FAG	—	JGC4070FAG	—
80	400–800	—	JGC3080AAG	—	JGC4080AAG
90	450–900	JGC3090FAG	—	JGC4090FAG	—
100	500–1000	JGC3100FAG	JGC3100AAG	JGC4100FAG	JGC4100AAG
125	625–1250	JGC3125FAG	JGC3125AAG	JGC4125FAG	JGC4125AAG
150	750–1550	JGC3150FAG	—	JGC4150FAG	—
160	800–1600	—	JGC3160AAG	—	JGC4160AAG
175	875–1750	JGC3175FAG	—	JGC4175FAG	—
200	1000–2000	JGC3200FAG	JGC3200AAG	JGC4200FAG	JGC4200AAG
225	1125–2250	JGC3225FAG	—	JGC4225FAG	—
250	1250–2500	JGC3250FAG	JGC3250AAG	JGC4250FAG	JGC4250AAG

#### JG-Frame



#### JG-Frame—IEC/CE/UL/CSA— 150/150, Current Limiting

Maximum Continuous Amperes	Magnetic Range	Three-Pole		Four-Pole 0% <sup>②</sup>	
		Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic <sup>①</sup> Catalog Number	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic <sup>①</sup> Catalog Number
70	350–700	JGU3070FAG	—	JGU4070FAG	—
80	400–800	—	JGU3080AAG	—	JGU4080AAG
90	450–900	JGU3090FAG	—	JGU4090FAG	—
100	500–1000	JGU3100FAG	JGU3100AAG	JGU4100FAG	JGU4100AAG
125	625–1250	JGU3125FAG	JGU3125AAG	JGU4125FAG	JGU4125AAG
150	750–1550	JGU3150FAG	—	JGU4150FAG	—
160	800–1600	—	JGU3160AAG	—	JGU4160AAG
175	875–1750	JGU3175FAG	—	JGU4175FAG	—
200	1000–2000	JGU3200FAG	JGU3200AAG	JGU4200FAG	JGU4200AAG
225	1125–2250	JGU3225FAG	—	JGU4225FAG	—
250	1250–2500	JGU3250FAG	JGU3250AAG	JGU4250FAG	JGU4250AAG

#### Notes

<sup>①</sup> EC-EN 60947-2 only. Adjustment is 0.8 and 1.0.

<sup>②</sup> Change the fourth digit to 8 for adjustable 0–60% neutral protection, 9 for 0–100% neutral protection. Neutral is on LH side.



# 2.2

## Molded Case Circuit Breakers

### Series G

Two-Pole not available in IEC/CE/UL/CSA 200/200

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#### JG-Frame



#### JG-Frame—IEC/CE/UL/CSA 200/200, Current Limiting

Maximum Continuous Amperes	Magnetic Range	Three-Pole		Four-Pole <sup>②</sup>	
		Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic <sup>①</sup> Catalog Number	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic <sup>①</sup> Catalog Number
70	350–700	JGX3070FAG	—	JGX4070FAG	—
80	400–800	—	JGX3080AAG	—	JGX4080AAG
90	450–900	JGX3090FAG	—	JGX4090FAG	—
100	500–1000	JGX3100FAG	JGX3100AAG	JGX4100FAG	JGX4100AAG
125	625–1250	JGX3125FAG	JGX3125AAG	JGX4125FAG	JGX4125AAG
150	750–1550	JGX3150FAG	—	JGX4150FAG	—
160	800–1600	—	JGX3160AAG	—	JGX4160AAG
175	875–1750	JGX3175FAG	—	JGX4175FAG	—
200	1000–2000	JGX3200FAG	JGX3200AAG	JGX4200FAG	JGX4200AAG
225	1125–2250	JGX3225FAG	—	JGX4225FAG	—
250	1250–2500	JGX3250FAG	JGX3250AAG	JGX4250FAG	JGX4250AAG

#### Molded Case Switches<sup>③</sup>

##### Catalog Number

JGK3250KSG

JGK7250KSG

##### Notes

- ① EC-EN 60947-2 only. Adjustment is 0.8 and 1.0.
- ② Change the fourth digit to 8 for adjustable 0–60% neutral protection, 9 for 0–100% neutral protection. Neutral is on LH side.
- ③ Molded case switches will trip above 2500 amperes.

## Frame—IC Rating at 415/480 Volts

Maximum Amperes	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole 0% Catalog Number
<b>25/25</b>			
250	JGE2250NN	JGE3250NN	JGE4250NN
<b>40/35</b>			
250	JGS2250NN	JGS3250NN	JGS4250NN
<b>70/65</b>			
250	JGH2250NN	JGH3250NN	JGH4250NN
<b>100/100 Current Limiting Per UL 489</b>			
250	—	JGC3250NN	JGC4250NN
<b>150/150 Current Limiting Per UL 489</b>			
250	—	JGU3250NN	JGU4250NN
<b>200/200 Current Limiting Per UL 489</b>			
250	—	JGX3250NN	JGX4250NN
<b>25/25 100% Rated Per UL 489 <sup>②</sup></b>			
250	—	JGE3250NNC	—
<b>40/35 100% Rated Per UL 489 <sup>②</sup></b>			
250	—	JGS3250NNC	—
<b>70/65 100% Rated Per UL 489 <sup>②</sup></b>			
250	—	JGH3250NNC	—

## Thermal-Magnetic Trip Unit

Ampere Rating	Range	Catalog Number		Range	Catalog Number		Catalog Number
70	350–700	JT2070FA	JT3070FA	—	—	JT4070FA	—
80	400–800	—	—	JT3080AA <sup>③</sup>	64–100	—	JT4080AA <sup>③</sup>
90	450–900	JT2090FA	JT3090FA	—	—	JT4090FA	—
100	500–1000	JT2100FA	JT3100FA	JT3100AA <sup>③</sup>	80–100	JT4100FA	JT4100AA <sup>③</sup>
125	625–1250	JT2125FA	JT3125FA	JT3125AA <sup>③</sup>	100–125	JT4125FA	JT4125AA <sup>③</sup>
150	750–1550	JT2150FA	JT3150FA	—	—	JT4150FA	—
160	800–1600	—	—	JT3160AA <sup>③</sup>	128–160	—	JT4160AA <sup>③</sup>
175	875–1750	JT2175FA	JT3175FA	—	—	JT4175FA	—
200	1000–2000	JT2200FA	JT3200FA	JT3200AA <sup>③</sup>	160–200	JT4200FA	JT4200AA <sup>③</sup>
225	1125–2250	JT2225FA	JT3225FA	—	—	JT4225FA	—
250	1250–2500	JT2250FA	JT3250FA	JT3250AA <sup>③</sup>	200–250	JT4250FA	JT4250AA <sup>③</sup>

## Notes

- ① Standard line and load terminals.
- ② Components—100% rated frame.
- ③ Adjustable thermal trip units are typically used in IEC markets and are not UL or CSA listed.

**Electronic Trip Units****JG Electronic Trip Units**

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Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
<b>Three-Pole</b>					
50	JT305033	JT305032	JT305035	JT305036	JGFCT050
100	JT310033	JT310032	JT310035	JT310036	JGFCT100
160	JT316033	JT316032	JT316035	JT316036	JGFCT160
250	JT325033	JT325032	JT325035	JT325036	JGFCT250
<b>Four-Pole <sup>②</sup></b>					
50	JT405033	JT405032	JT405035	JT405036	—
100	JT410033	JT410032	JT410035	JT410036	—
160	JT416033	JT416032	JT416035	JT416036	—
250	JT425033	JT425032	JT425035	JT425036	—

**Plug-In Test Kit**

Voltage Rating	Catalog Number
120 Vac	MTST120V
230 Vac	MTST230V

**Breaker Mount Ammeter**

Description	Catalog Number
Breaker mount ammeter	DIGIVIEW

**Notes**

<sup>①</sup> For use on a three-pole breaker used in a four-wire system if ground fault protection for the neutral is required.

<sup>②</sup> Neutral protection 4 = 0%, 6 = 60%, 7 = 100% electronic trip unit neutral protection is not adjustable.

Long time pickup—selectable via dial setting.

50 ampere settings—50, 45, 40, 32, 30, 25, 20.

100 ampere settings—100, 90, 80, 70, 63, 50, 45, 40.

160 ampere settings—160, 150, 125, 110, 100, 90, 80, 63.

250 ampere settings—250, 225, 200, 175, 160, 150, 125, 100.

Adjustable long time delay—2–24 seconds at 6 x I<sub>r</sub>.

Adjustable short time delay—Inst., 120, 300 ms

**Complete Breaker with Electronic Trip Units****IEC/UL/CSA – 25/25**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
<b>Three-Pole</b>					
50	JGE305033G	JGE305032G	JGE305035G	JGE305036G	JGFCT050
100	JGE310033G	JGE310032G	JGE310035G	JGE310036G	JGFCT100
160	JGE316033G	JGE316032G	JGE316035G	JGE316036G	JGFCT160
250	JGE325033G	JGE325032G	JGE325035G	JGE325036G	JGFCT250
<b>Four-Pole <sup>②</sup></b>					
50	JGE405033G	JGE405032G	JGE405035G	JGE405036G	—
100	JGE410033G	JGE410032G	JGE410035G	JGE410036G	—
160	JGE416033G	JGE416032G	JGE416035G	JGE416036G	—
250	JGE425033G	JGE425032G	JGE425035G	JGE425036G	—

**IEC/UL/CSA – 40/35**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
<b>Three-Pole</b>					
50	JGS305033G	JGS305032G	JGS305035G	JGS305036G	JGFCT050
100	JGS310033G	JGS310032G	JGS310035G	JGS310036G	JGFCT100
160	JGS316033G	JGS316032G	JGS316035G	JGS316036G	JGFCT160
250	JGS325033G	JGS325032G	JGS325035G	JGS325036G	JGFCT250
<b>Four-Pole <sup>②</sup></b>					
50	JGS405033G	JGS405032G	JGS405035G	JGS405036G	—
100	JGS410033G	JGS410032G	JGS410035G	JGS410036G	—
160	JGS416033G	JGS416032G	JGS416035G	JGS416036G	—
250	JGS425033G	JGS425032G	JGS425035G	JGS425036G	—

**IEC/UL/CSA – 70/65**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
<b>Three-Pole</b>					
50	JGH305033G	JGH305032G	JGH305035G	JGH305036G	JGFCT050
100	JGH310033G	JGH310032G	JGH310035G	JGH310036G	JGFCT100
160	JGH316033G	JGH316032G	JGH316035G	JGH316036G	JGFCT160
250	JGH325033G	JGH325032G	JGH325035G	JGH325036G	JGFCT250
<b>Four-Pole <sup>②</sup></b>					
50	JGH405033G	JGH405032G	JGH405035G	JGH405036G	—
100	JGH410033G	JGH410032G	JGH410035G	JGH410036G	—
160	JGH416033G	JGH416032G	JGH416035G	JGH416036G	—
250	JGH425033G	JGH425032G	JGH425035G	JGH425036G	—

**Notes**

<sup>①</sup> Required for four-wire systems if neutral protection is required.

<sup>②</sup> Neutral protection 4 = 0%, 6 = 60%, 7 = 100% electronic trip unit neutral protection is not adjustable.

## IEC/UL/CSA—100/100, Current Limiting Per UL 489

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
<b>Three-Pole</b>					
50	JGC305033G	JGC305032G	JGC305035G	JGC305036G	JGFCT050
100	JGC310033G	JGC310032G	JGC310035G	JGC310036G	JGFCT100
160	JGC316033G	JGC316032G	JGC316035G	JGC316036G	JGFCT160
250	JGC335033G	JGC325032G	JGC325035G	JGC325036G	JGFCT250
<b>Four-Pole <sup>②</sup></b>					
50	JGC405033G	JGC405032G	JGC405035G	JGC405036G	—
100	JGC410033G	JGC410032G	JGC410035G	JGC410036G	—
160	JGC416033G	JGC416032G	JGC416035G	JGC416036G	—
250	JGC435033G	JGC425032G	JGC425035G	JGC425036G	—

## IEC/UL/CSA—150/150, Current Limiting Per UL 489

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
<b>Three-Pole</b>					
50	JGU305033G	JGU305032G	JGU305035G	JGU305036G	JGFCT050
100	JGU310033G	JGU310032G	JGU310035G	JGU310036G	JGFCT100
160	JGU316033G	JGU316032G	JGU316035G	JGU316036G	JGFCT160
250	JGU335033G	JGU325032G	JGU325035G	JGU325036G	JGFCT250
<b>Four-Pole <sup>②</sup></b>					
50	JGU405033G	JGU405032G	JGU405035G	JGU405036G	—
100	JGU410033G	JGU410032G	JGU410035G	JGU410036G	—
160	JGU416033G	JGU416032G	JGU416035G	JGU416036G	—
250	JGU435033G	JGU425032G	JGU425035G	JGU425036G	—

## IEC/UL/CSA—200/200, Current Limiting Per UL 489

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
<b>Three-Pole</b>					
50	JGX305033G	JGX305032G	JGX305035G	JGX305036G	JGFCT050
100	JGX310033G	JGX310032G	JGX310035G	JGX310036G	JGFCT100
160	JGX316033G	JGX316032G	JGX316035G	JGX316036G	JGFCT160
250	JGX325033G	JGX325032G	JGX325035G	JGX325036G	JGFCT250
<b>Four-Pole <sup>②</sup></b>					
50	JGX405033G	JGX405032G	JGX405035G	JGX405036G	—
100	JGX410033G	JGX410032G	JGX410035G	JGX410036G	—
160	JGX416033G	JGX416032G	JGX416035G	JGX416036G	—
250	JGX425033G	JGX425032G	JGX425035G	JGX425036G	—

**Notes**

① Required for four-wire systems if neutral protection is required.

② Neutral protection 4 = 0%, 6 = 60%, 7 = 100% electronic trip unit neutral protection is not adjustable.

**JG 100% Rated Circuit Breaker—Thermal-Magnetic Trip Unit**

**Complete Breaker (Includes Frame, Trip Unit, Standard Terminals and Mounting Hardware)—IC Rating at 415/480 Volts**

JG-Frame



**JG-Frame—IEC/CE/UL/CSA—25/25**

Maximum Continuous Amperes	Magnetic Range	Three-Pole
		Fixed Thermal, Adjustable Magnetic Catalog Number
70	350–700	JGE3070FAGC
90	450–900	JGE3090FAGC
100	500–1000	JGE3100FAGC
125	625–1250	JGE3125FAGC
150	750–1550	JGE3150FAGC
160	800–1600	—
175	875–1750	JGE3175FAGC
200	1000–2000	JGE3200FAGC
225	1125–2250	JGE3225FAGC
250	1250–2500	JGE3250FAGC

**JG-Frame—IEC/CE/UL/CSA—70/65**

Maximum Continuous Amperes	Magnetic Range	Three-Pole
		Fixed Thermal, Adjustable Magnetic Catalog Number
70	350–700	JGH3070FAGC
90	450–900	JGH3090FAGC
100	500–1000	JGH3100FAGC
125	625–1250	JGH3125FAGC
150	750–1550	JGH3150FAGC
160	800–1600	—
175	875–1750	JGH3175FAGC
200	1000–2000	JGH3200FAGC
225	1125–2250	JGH3225FAGC
250	1250–2500	JGH3250FAGC

**JG-Frame—IEC/CE/UL/CSA—40/35**

Maximum Continuous Amperes	Magnetic Range	Three-Pole
		Fixed Thermal, Adjustable Magnetic Catalog Number
70	350–700	JGS3070FAGC
90	450–900	JGS3090FAGC
100	500–1000	JGS3100FAGC
125	625–1250	JGS3125FAGC
150	750–1550	JGS3150FAGC
160	800–1600	—
175	875–1750	JGS3175FAGC
200	1000–2000	JGS3200FAGC
225	1125–2250	JGS3225FAGC
250	1250–2500	JGS3250FAGC

# 2.2

## Molded Case Circuit Breakers

### Series G

2

#### JG 100% Rated Electronic Trip Unit Circuit Breaker

##### IEC/UL/CSA—25/25

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG ① Catalog Number
50	JGE305033GC	JGE305032GC	JGE305035GC	JGE305036GC	JGFCT050
100	JGE310033GC	JGE310032GC	JGE310035GC	JGE310036GC	JGFCT100
160	JGE316033GC	JGE316032GC	JGE316035GC	JGE316036GC	JGFCT160
250	JGE325033GC	JGE325032GC	JGE325035GC	JGE325036GC	JGFCT250

##### IEC/UL/CSA—40/35

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG ① Catalog Number
50	JGS305033GC	JGS305032GC	JGS305035GC	JGS305036GC	JGFCT050
100	JGS310033GC	JGS310032GC	JGS310035GC	JGS310036GC	JGFCT100
160	JGS316033GC	JGS316032GC	JGS316035GC	JGS316036GC	JGFCT160
250	JGS325033GC	JGS325032GC	JGS325035GC	JGS325036GC	JGFCT250

##### IEC/UL/CSA—70/65

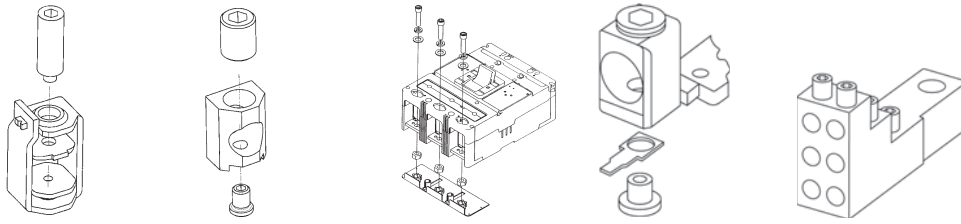
Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG ① Catalog Number
50	JGH305033GC	JGH305032GC	JGH305035GC	JGH305036GC	JGFCT050
100	JGH310033GC	JGH310032GC	JGH310035GC	JGH310036GC	JGFCT100
160	JGH316033GC	JGH316032GC	JGH316035GC	JGH316036GC	JGFCT160
250	JGH325033GC	JGH325032GC	JGH325035GC	JGH325036GC	JGFCT250

#### Note

① Required for four-wire systems if neutral protection is required.

Accessories Selection Guide and Ordering Information

JG-Frame



T250FJ	TA250FJ	Endcap Kit	Control Wire Terminal Kit	Multiwire Connectors
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Load and Line Terminals

Maximum Breaker Amperes	Terminal Body Material	Wire Type	Metric Wire Range mm <sup>2</sup>	AWG Wire Range/ Number of Conductors	Catalog Number
<b>Standard Pressure Type Terminals</b>					
250	Stainless steel	Cu	25–185	#4–350 (1)	T250FJ ①
250	Aluminum	Cu/Al	10–185	#8–350 (1)	TA250FJ ①②

JG-Frame circuit breakers include aluminum terminals TA250FJ as standard. When optional stainless steel only terminals are required, order by catalog number.

Endcap Kits

Number of Poles	Catalog Number	
	Metric	Imperial
3	FJ3RTWK	FJ3RTDK
4	FJ4RTWK	FJ4RTDK

Endcap kits are used on J250-Frame breaker to connect busbar or similar electrical connections. Includes hardware.

Control Wire Terminal Kit

Description	Catalog Number
Package of 14 (priced individually)	FJCWTK

For use with aluminum or copper terminals only.

Base Mounting Hardware

Base mounting hardware is included with a circuit breaker or molded case switch. (Included with breaker.) If required separately, order 66A2546G02.

Terminal Shields IP30

Location	Number of Poles	Catalog Number
Line or Load	2, 3	FJTS3K
	4	FJTS4K

Interphase Barriers

Number of Poles	Catalog Number
3	FJIPBK ③
4	FJIPBK4 ③

Multiwire Connectors

Field-installed multiwire connectors for the load side (OFF) end terminals. They are used to distribute the load from the circuit breaker to multiple devices without the use of separate distribution terminal blocks.

Multiwire lug kits include terminal shield, mounting hardware, insulators and tin-plated aluminum connectors to replace three mechanical load lugs. UL listed as used on the load side (OFF) end.

JG-Frame Multiwire Connectors Ordering Information (Package of 3)

Maximum Amperes	Wires per Terminal	Wire Size Range AWG Cu	Kit Catalog Number
250	3	14–2	3TA250FJ3
250	6	14–6	3TA250FJ6

Notes

- ① Individually packed.
- ② Standard line and load.
- ③ Individually priced.



## Accessories

**Allowable Accessory Combinations**

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

**JG-Frame Accessories**

Description	Reference Page	Two- and Three-Pole			Four-Pole			Neutral
		Left	Center	Right	Left	Center	Right	
<b>Internal Accessories</b> (Only one internal accessory per pole)								
Alarm lockout (Make/Break)	V4-T2-104	—	—	■	—	—	■	—
Auxiliary switch (1A, 1B)	V4-T2-104	—	—	■	—	—	■	—
Auxiliary switch (2A, 2B)	V4-T2-104	—	—	■	—	—	■	—
Auxiliary switch and alarm switch combination	V4-T2-104	—	—	■	—	—	■	—
Shunt trip—standard	V4-T2-104	■	—	—	■	—	—	—
Undervoltage release mechanism	V4-T2-105	■	—	—	■	—	—	—
<b>External Accessories</b>								
End cap kit	V4-T2-41	●	●	●	●	●	●	●
Control wire terminal kit	V4-T2-41	●	●	●	●	●	●	●
Multewire connectors	V4-T2-41	●	●	●	●	●	●	●
Base mounting hardware	V4-T2-41	●	●	●	●	●	●	●
Interphase barriers	V4-T2-41	●	●	●	●	●	●	●
Padlockable handle block	V4-T2-102	—	■	—	—	■	—	—
Padlockable handle lock hasp	V4-T2-102	□	—	□	□	—	□	—
Key interlock kit	V4-T2-102	□	—	□	□	—	□	—
Sliding bar interlock—requires two breakers	V4-T2-102	●	●	●	—	—	—	—
Electrical operator	V4-T2-102	●	●	●	●	●	●	●
Plug-in adapters	V4-T2-102	●	●	●	●	●	●	●
Handle mechanisms	V4-T2-407	●	●	●	●	●	●	●
Earth leakage/ground fault protector	V4-T2-87	●	●	●	●	●	●	●
Drawout cassette	V4-T2-109	●	●	●	●	●	●	●
Digitrip 310+ test kit	V4-T2-36	●	●	●	●	●	●	●
Ammeter/cause of trip display	V4-T2-101	●	●	●	●	●	●	●
Cause of trip LED module	V4-T2-101	●	●	●	●	●	●	●
<b>Modifications (Refer to Eaton)</b>								
Moisture fungus treatment	V4-T2-100	●	●	●	●	●	●	●
Freeze-tested circuit breakers	—	●	●	●	●	●	●	●
Marine/naval application, UL 489 supplement SA and SB	①	●	●	●	●	●	●	●

**Legend**

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

**Note**

① Contact Eaton.

**Technical Data and Specifications**

**UL 489/IEC 60947-2 Interrupting Capacity (Symmetrical Amperes) (kA) Ratings**

Circuit Breaker Type	Number of Poles	Volts AC (50/60 Hz)								Volts DC <sup>①</sup>	
		220–240		380–415		480		600		690 <sup>②</sup>	250 <sup>②③</sup>
		I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	480	600	I <sub>cu</sub>	I <sub>cs</sub>		
JGE250	2, 3, 4	65	65	25	25	25	18	12	6	10	
JGS250	2, 3, 4	85	85	40	40	35	18	12	6	22	
JGH250	2, 3, 4	100	100	70	70	65	25	14	7	22	
JGC250 <sup>④</sup>	3, 4	200	200	100	100	100	35	16	12	42	
JGU250 <sup>④</sup>	3, 4	200	200	150	150	150	50	18	14	50	
JGX250 <sup>④</sup>	3, 4	200	200	200	200	200	50	18	14	50	

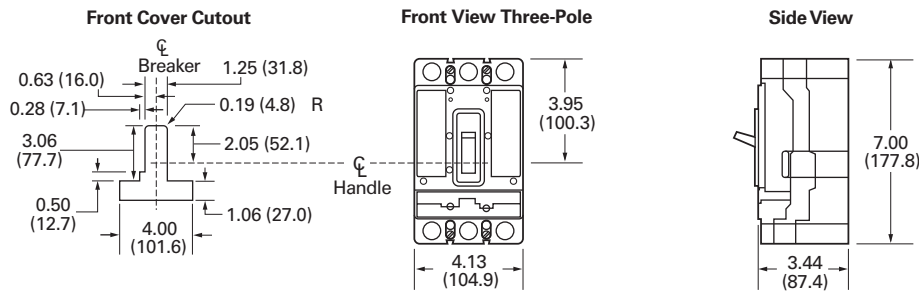
**Dimensions and Weights**

Approximate Dimensions in Inches (mm)

**JG-Frame**

Number of Poles	Width	Height	Depth
2, 3	4.13 (104.9)	7.00 (177.8)	3.57 (90.7)
4	5.34 (135.6)	7.00 (177.8)	3.57 (90.7)

**JG-Frame**



Approximate Shipping Weight in Lbs (kg)

**JG-Frame**

Breaker Type	Number of Poles	
	2, 3	4
JGC	6.00 (2.70)	8.00 (3.60)
JGE	6.00 (2.70)	8.00 (3.60)
JGH	6.00 (2.70)	8.00 (3.60)
JGS	6.00 (2.70)	8.00 (3.60)
JGU	6.00 (2.70)	8.00 (3.60)
JGX	6.00 (2.70)	8.00 (3.60)

**Notes**

- ① DC ratings apply to substantially non-inductive circuits.
- ② Two-pole circuit breaker, or two poles of three-pole circuit breaker.
- ③ Time constant is 3 milliseconds minimum at 10 kA and 8 milliseconds minimum at 22 kA.
- ④ Current limiting per UL 489.

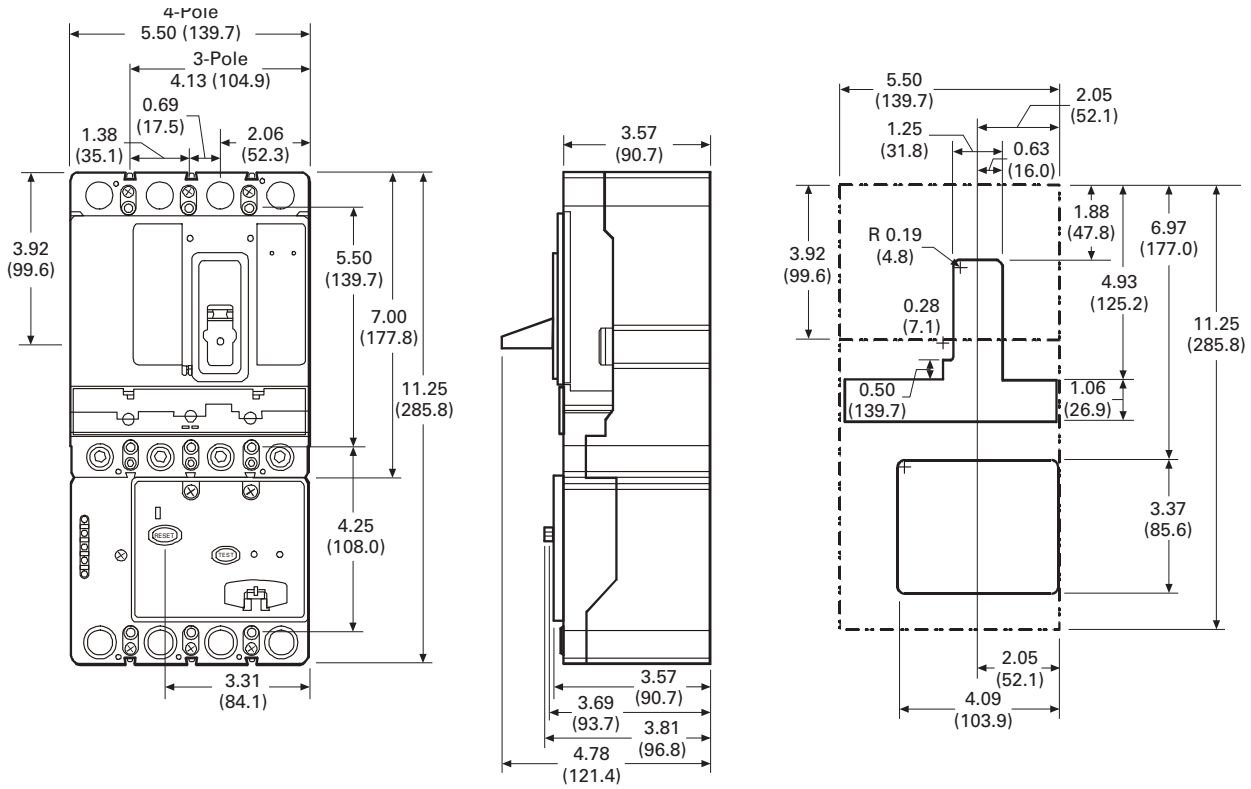
# 2.2

## Molded Case Circuit Breakers

### Series G

#### JG-Frame With Earth Leakage Module

2



**LG-Frame (250–630 Amperes)**



**LG-Frame (250–630 Amperes)**

**Product Description**

LG breaker is HACR rated.

**Contents**

<i>Description</i>	<i>Page</i>
EG-Frame (15–125 Amperes) . . . . .	<b>V4-T2-15</b>
JG-Frame (63–250 Amperes) . . . . .	<b>V4-T2-29</b>
LG-Frame (250–630 Amperes)	
Catalog Number Selection . . . . .	<b>V4-T2-46</b>
Product Selection . . . . .	<b>V4-T2-47</b>
Accessories . . . . .	<b>V4-T2-58</b>
Technical Data and Specifications . . . . .	<b>V4-T2-59</b>
Dimensions and Weights . . . . .	<b>V4-T2-59</b>
NG-Frame (320–1200 Amperes) . . . . .	<b>V4-T2-61</b>
RG-Frame (800–2500 Amperes) . . . . .	<b>V4-T2-70</b>
Motor Circuit Protectors (MCP) . . . . .	<b>V4-T2-80</b>
Motor Protector Circuit Breakers (MPCB) . . . . .	<b>V4-T2-84</b>
30 mA Ground Fault (Earth Leakage) Module . . . . .	<b>V4-T2-87</b>
Current Limiting Circuit Breaker Module . . . . .	<b>V4-T2-91</b>
High Instantaneous Circuit Breaker for Selective Coordination. . . . .	<b>V4-T2-96</b>
Special Features and Accessories . . . . .	<b>V4-T2-99</b>
Motor Operators . . . . .	<b>V4-T2-106</b>
Plug-In Blocks . . . . .	<b>V4-T2-108</b>
Drawout Cassette . . . . .	<b>V4-T2-109</b>

# 2.2

## Molded Case Circuit Breakers

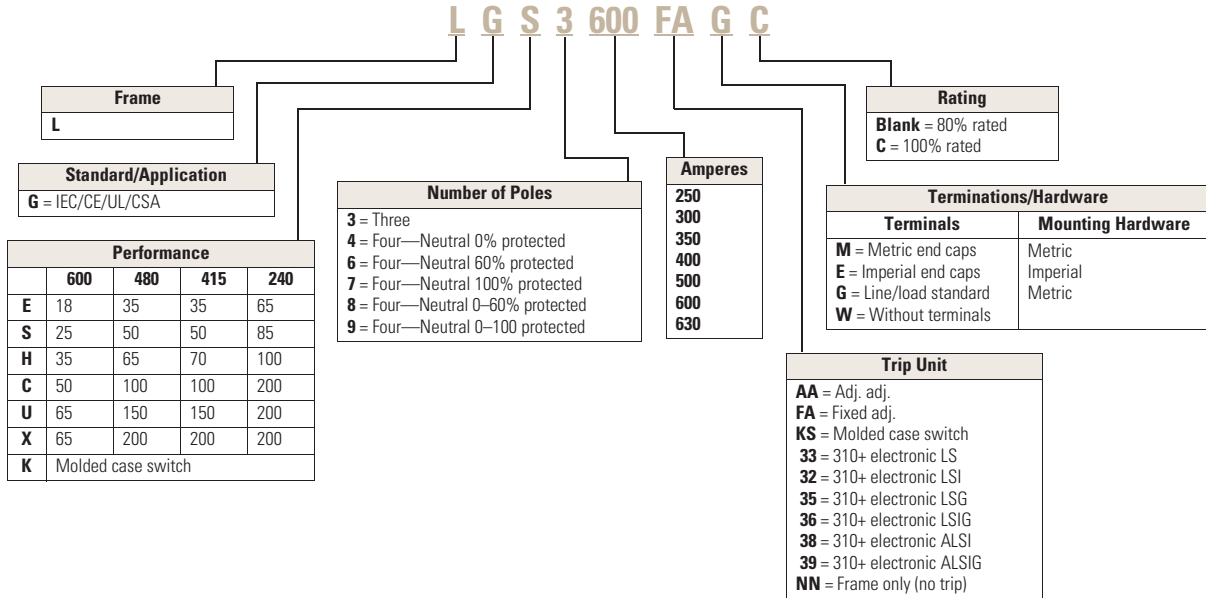
### Series G

#### Catalog Number Selection

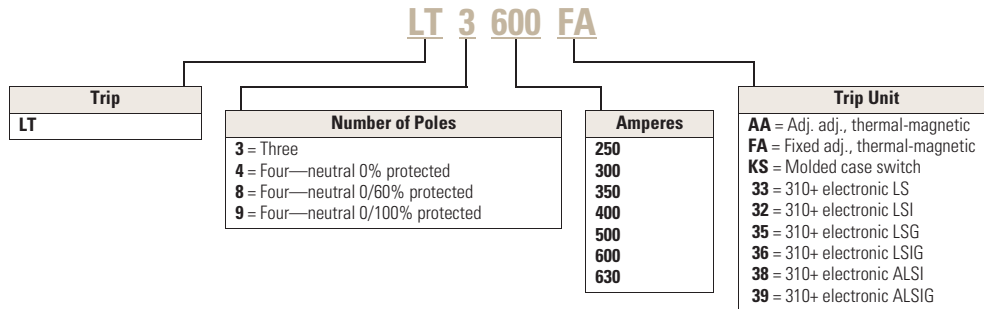
This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

2

#### Series G—LG-Frame (250–630 Amperes)



#### Trip Unit



Product Selection

Complete Breaker (Includes Frame, Trip Unit, Standard Terminals and Mounting Hardware)

LG-Frame



**LG-Frame—630 Amperes (600 Amperes UL, CSA)**  
**IC Rating: 35 kAIC at 415 and 480 Vac** ①

Ampere Rating	Three-Pole ②		Four-Pole (0%) ③	
	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic ④⑤ Catalog Number	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic ④⑤ Catalog Number
250	LGE3250FAG	LGE3250AAG	LGE4250FAG	LGE4250AAG
300	LGE3300FAG	—	LGE4300FAG	—
320	—	LGE3320AAG	—	LGE4320AAG
350	LGE3350FAG	—	LGE4350FAG	—
400	LGE3400FAG	LGE3400AAG	LGE4400FAG	LGE4400AAG
500	LGE3500FAG	LGE3500AAG	LGE4500FAG	LGE4500AAG
600	LGE3600FAG	—	LGE4600FAG	—
630 ④	—	LGE3630AAG	—	LGE4630AAG

LG-Frame



**LG-Frame—630 Amperes (600 Amperes UL, CSA)**  
**IC Rating: 50 kAIC at 415 and 480 Vac** ①

Ampere Rating	Three-Pole ②		Four-Pole (0%) ③	
	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic ④⑤ Catalog Number	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic ④⑤ Catalog Number
250	LGS3250FAG	LGS3250AAG	LGS4250FAG	LGS4250AAG
300	LGS3300FAG	—	LGS4300FAG	—
320	—	LGS3320AAG	—	LGS4320AAG
350	LGS3350FAG	—	LGS4350FAG	—
400	LGS3400FAG	LGS3400AAG	LGS4400FAG	LGS4400AAG
500	LGS3500FAG	LGS3500AAG	LGS4500FAG	LGS4500AAG
600	LGS3600FAG	—	LGS4600FAG	—
630 ④	—	LGS3630AAG	—	LGS4630AAG

LG-Frame



**LG-Frame—630 Amperes (600 Amperes UL, CSA)**  
**IC Rating: 70 kAIC at 415, 65 kAIC at 480 Vac** ①

Ampere Rating	Three-Pole ②		Four-Pole (0%) ③	
	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic ④⑤ Catalog Number	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic ④⑤ Catalog Number
250	LGH3250FAG	LGH3250AAG	LGH4250FAG	LGH4250AAG
300	LGH3300FAG	—	LGH4300FAG	—
320	—	LGH3320AAG	—	LGH4320AAG
350	LGH3350FAG	—	LGH4350FAG	—
400	LGH3400FAG	LGH3400AAG	LGH4400FAG	LGH4400AAG
500	LGH3500FAG	LGH3500AAG	LGH4500FAG	LGH4500AAG
600	LGH3600FAG	—	LGH4600FAG	—
630 ④	—	LGH3630AAG	—	LGH4630AAG

**Notes**

- ① Replace suffix “G” with “W” for no line and load terminals.
- ② For two-pole applications, use two outer poles.
- ③ Neutral protection is indicated by the fourth character: 4 = 0%, 7 = 100%, 8 = adjustable 0–60% and 9 = 0–100%. Neutral is on LH side.
- ④ 320/630 amperes is not a UL or CSA listed rating. 600 amperes is the maximum UL and CSA rating for the LG.
- ⑤ Adjustable thermal units are typically used in IEC markets and are not UL or CSA listed.

# 2.2

## Molded Case Circuit Breakers

### Series G

#### Complete Breaker (Includes Frame, Trip Unit, Standard Terminals and Mounting Hardware)

2

##### LG-Frame



#### LG-Frame—630 Amperes (600 Amperes UL, CSA), Current Limiting Per UL 489 IC Rating: 100 kAIC at 415 and 480 Vac ①

Ampere Rating	Three-Pole ②		Four-Pole (0%) ③	
	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic ④⑤ Catalog Number	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic ④⑤ Catalog Number
250	LGC3250FAG	LGC3250AAG	LGC4250FAG	LGC4250AAG
300	LGC3300FAG	—	LGC4300FAG	—
320	—	LGC3320AAG	—	LGC4320AAG
350	LGC3350FAG	—	LGC4350FAG	—
400	LGC3400FAG	LGC3400AAG	LGC4400FAG	LGC4400AAG
500	LGC3500FAG	LGC3500AAG	LGC4500FAG	LGC4500AAG
600	LGC3600FAG	—	LGC4600FAG	—
630 ④	—	LGC3630AAG	—	LGC4630AAG

##### LG-Frame



#### LG-Frame—630 Amperes (600 Amperes UL, CSA), Current Limiting Per UL 489 IC Rating: 150 kAIC at 415 and 480 Vac ①

Ampere Rating	Three-Pole ②		Four-Pole (0%) ③	
	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic ④⑤ Catalog Number	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic ④⑤ Catalog Number
250	LGU3250FAG	LGU3250AAG	LGU4250FAG	LGU4250AAG
300	LGU3300FAG	—	LGU4300FAG	—
320	—	LGU3320AAG	—	LGU4320AAG
350	LGU3350FAG	—	LGU4350FAG	—
400	LGU3400FAG	LGU3400AAG	LGU4400FAG	LGU4400AAG
500	LGU3500FAG	LGU3500AAG	LGU4500FAG	LGU4500AAG
600	LGU3600FAG	—	LGU4600FAG	—
630 ④	—	LGU3630AAG	—	LGU4630AAG

##### LG-Frame



#### LG-Frame—630 Amperes (600 Amperes UL, CSA), Current Limiting Per UL 489 IC Rating: 200 kAIC at 415 and 480 Vac ①

Ampere Rating	Three-Pole ②		Four-Pole (0%) ③	
	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic ④⑤ Catalog Number	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic ④⑤ Catalog Number
250	LGX3250FAG	LGX3250AAG	LGX4250FAG	LGX4250AAG
300	LGX3300FAG	—	LGX4300FAG	—
320	—	LGX3320AAG	—	LGX4320AAG
350	LGX3350FAG	—	LGX4350FAG	—
400	LGX3400FAG	LGX3400AAG	LGX4400FAG	LGX4400AAG
500	LGX3500FAG	LGX3500AAG	LGX4500FAG	LGX4500AAG
600	LGX3600FAG	—	LGX4600FAG	—
630 ④	—	LGX3630AAG	—	LGX4630AAG

#### Notes

- ① Replace suffix "G" with "W" for no line and load terminals.
- ② For two-pole applications, use two outer poles.
- ③ Neutral protection is indicated by the fourth character: 4 = 0%, 7 = 100%, 8 = adjustable 0–60% and 9 = 0–100%. Neutral is on LH side.
- ④ 320/630 amperes is not a UL or CSA listed rating. 600 amperes is the maximum UL and CSA rating for the LG.
- ⑤ Adjustable thermal units are typically used in IEC markets and are not UL or CSA listed.

**Molded Case Switches** <sup>①</sup>

Ampere Rating	Number of Poles	Catalog Number
400	3 <sup>②</sup>	LGK3400KSG
	4	LGK4400KSG
630 <sup>③</sup>	3 <sup>②</sup>	LGK3630KSG
	4	LGK4630KSG

**Frame—IC Rating at 415/480 Volts**

Maximum Amperes <sup>③</sup>	Three-Pole <sup>②</sup> Catalog Number	Four-Pole 0% Catalog Number
<b>35/35</b>		
630 <sup>③</sup>	LGE3630NN	LGE4630NN
	LGE3630NNWC	—
<b>50/50</b>		
630 <sup>③</sup>	LGS3630NN	LGS4630NN
	LGS3630NNWC	—
<b>70/53</b>		
630 <sup>③</sup>	LGH3630NN	LGH4630NN
	LGH3630NNWC	—
<b>100/100 Current Limiting Per UL 489</b>		
630	LGC3630NN	LGC4630NN
<b>150/150 Current Limiting Per UL 489</b>		
630	LGU3630NN	LGU4630NN
<b>200/200 Current Limiting</b>		
630	LGX3630NN	LGX4630NN

**Thermal-Magnetic Trip Unit**

Ampere Rating	Three-Pole <sup>②</sup> Fixed Thermal, Adjustable Magnetic	Adjustable Thermal, Adjustable Magnetic <sup>④</sup> Catalog Number	Four-Pole (0%) <sup>⑤</sup> Fixed Thermal, Adjustable Magnetic	Adjustable Thermal, Adjustable Magnetic <sup>④</sup> Catalog Number
	Catalog Number		Catalog Number	
250	LT3250FA	LT3250AA	LT4250FA	LT4250AA
300	LT3300FA	—	LT4300FA	—
320	—	LT3320AA	—	LT4320AA
350	LT3350FA	—	LT4350FA	—
400	LT3400FA	LT3400AA	LT4400FA	LT4400AA
500	LT3500FA	LT3500AA	LT4500FA	LT4500AA
600	LT3600FA	—	LT4600FA	—
630	—	LT3630AA	—	LT4630AA

**Notes**

- ① Molded case switches will trip above 6300 amperes.  
 ② For two-pole applications, use two outer poles.  
 ③ 630 amperes is not a UL or CSA listed rating. 600 amperes is the maximum UL and CSA rating for the LG.  
 ④ Adjustable thermal, adjustable magnetic trip units are typically used in IEC markets and are not UL or CSA listed.  
 ⑤ Neutral protection is indicated by the third character: 4 = 0%, 7 = 100%, 8 = adjustable 0–60% and 9 = 0–100%.  
 ⑥ 100% rated frame.



## Electronic Trip Units—Digitrip 310+

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
<b>Three-Pole</b>					
250	LT325033	LT325032	LT325035	LT325036	LGFACT250
400	LT340033	LT340032	LT340035	LT340036	LGFACT400
600	LT360033	LT360032	LT360035	LT360036	LGFACT600
630 <sup>②</sup>	LT363033	LT363032	LT363035	LT363036	LGFACT600
<b>Four-Pole <sup>③</sup></b>					
250	LT425033	LT425032	LT425035	LT425036	—
400	LT440033	LT440032	LT440035	LT440036	—
600	LT460033	LT460032	LT460035	LT460036	—
630 <sup>②</sup>	LT463033	LT463032	LT463035	LT463036	—

Plug-In Test Kit <sup>④</sup>

Voltage Rating	Catalog Number
120 Vac	MTST120V
230 Vac	MTST230V

**Notes**

- ① Required for four-wire systems if neutral protection is desired.  
 ② 630 amperes is not a UL or CSA listed rating. 600 amperes is the maximum UL and CSA listed rating for the LG.  
 ③ Neutral protection: 4 = 0%, 6 = 60%, 7 = 100%. Electronic trip unit neutral protection is not adjustable.  
 ④ IL Number is 5721B13.

Long time pickup — selectable via dial setting.  
 630 ampere settings — 630, 600, 500, 400, 350, 315, 300, 250 (315, 630 are IEC ratings only).  
 600 ampere settings — 600, 500, 450, 400, 350, 315, 300, 250 (315 is IEC rating only).  
 400 ampere settings — 400, 350, 315, 300, 250, 225, 200, 160 (315 is IEC rating only).  
 250 ampere settings — 250, 225, 200, 175, 160, 150, 125, 100 (160 is IEC rating only).

Adjustable long time delay — 2–24 seconds at 6 x I<sub>r</sub>.  
 Adjustable short time delay — Inst., 120, 300 ms.

**IC Rating at 415/480V****Complete LG Breakers with Electronic Trip Unit (Includes Frame, Trip Unit, Standard Terminals and Mounting Hardware) ①****IC Rating: 35 kAIC at 415 and 480 Vac**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG ② Catalog Number
<b>Three-Pole ③</b>					
250	LGE325033G	LGE325032G	LGE325035G	LGE325036G	LGFACT250
400	LGE340033G	LGE340032G	LGE340035G	LGE340036G	LGFACT400
600	LGE360033G	LGE360032G	LGE360035G	LGE360036G	LGFACT600
630 ④	LGE363033G	LGE363032G	LGE363035G	LGE363036G	LGFACT600
<b>Four-Pole ⑤</b>					
250	LGE425033G	LGE425032G	LGE425035G	LGE425036G	—
400	LGE440033G	LGE440032G	LGE440035G	LGE440036G	—
600	LGE460033G	LGE460032G	LGE460035G	LGE460036G	—
630 ④	LGE463033G	LGE463032G	LGE463035G	LGE463036G	—

**IC Rating: 50 kAIC at 415 and 480 Vac**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG ② Catalog Number
<b>Three-Pole ③</b>					
250	LGS325033G	LGS325032G	LGS325035G	LGS325036G	LGFACT250
400	LGS340033G	LGS340032G	LGS340035G	LGS340036G	LGFACT400
600	LGS360033G	LGS360032G	LGS360035G	LGS360036G	LGFACT600
630 ④	LGS363033G	LGS363032G	LGS363035G	LGS363036G	LGFACT600
<b>Four-Pole ⑤</b>					
250	LGS425033G	LGS425032G	LGS425035G	LGS425036G	—
400	LGS440033G	LGS440032G	LGS440035G	LGS440036G	—
600	LGS460033G	LGS460032G	LGS460035G	LGS460036G	—
630 ④	LGS463033G	LGS463032G	LGS463035G	LGS463036G	—

**IC Rating: 70 kAIC at 415 Vac, 65 kAIC at 480 Vac**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG ② Catalog Number
<b>Three-Pole ③</b>					
250	LGH325033G	LGH325032G	LGH325035G	LGH325036G	LGFACT250
400	LGH340033G	LGH340032G	LGH340035G	LGH340036G	LGFACT400
600	LGH360033G	LGH360032G	LGH360035G	LGH360036G	LGFACT600
630 ④	LGH363033G	LGH363032G	LGH363035G	LGH363036G	LGFACT600
<b>Four-Pole ⑤</b>					
250	LGH425033G	LGH425032G	LGH425035G	LGH425036G	—
400	LGH440033G	LGH440032G	LGH440035G	LGH440036G	—
600	LGH460033G	LGH460032G	LGH460035G	LGH460036G	—
630 ④	LGH463033G	LGH463032G	LGH463035G	LGH463036G	—

**Notes**

- ① Replace suffix "G" with "W" for no line and load terminals.  
 ② Required for four-wire systems if neutral protection is desired.  
 ③ For two-pole applications, use two outer poles.  
 ④ 630 amperes is not a UL or CSA listed rating. 600 amperes is the maximum UL and CSA listed rating for the LG.  
 ⑤ Neutral protection: 4 = 0%, 6 = 60%, 7 = 100%. Electronic trip unit neutral protection is not adjustable.

**IC Rating at 415/480V****Complete LG Breakers with Electronic Trip Unit (Includes Frame, Trip Unit, Standard Terminals and Mounting Hardware) ①****IC Rating: 100 kAIC at 415 Vac and 480 Vac, Current Limiting Per UL 489**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG ② Catalog Number
<b>Three-Pole ③</b>					
250	LGC325033G	LGC325032G	LGC325035G	LGC325036G	LGFACT250
400	LGC340033G	LGC340032G	LGC340035G	LGC340036G	LGFACT400
600	LGC360033G	LGC360032G	LGC360035G	LGC360036G	LGFACT600
630 ④	LGC363033G	LGC363032G	LGC363035G	LGC363036G	LGFACT600
<b>Four-Pole ⑤</b>					
250	LGC425033G	LGC425032G	LGC425035G	LGC425036G	—
400	LGC440033G	LGC440032G	LGC440035G	LGC440036G	—
600	LGC460033G	LGC460032G	LGC460035G	LGC460036G	—
630 ④	LGC463033G	LGC463032G	LGC463035G	LGC463036G	—

**IC Rating: 150 kAIC at 415 Vac and 480 Vac, Current Limiting Per UL 489**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG ② Catalog Number
<b>Three-Pole ③</b>					
250	LGU325033G	LGU325032G	LGU325035G	LGU325036G	LGFACT250
400	LGU340033G	LGU340032G	LGU340035G	LGU340036G	LGFACT400
600	LGU360033G	LGU360032G	LGU360035G	LGU360036G	LGFACT600
630 ④	LGU363033G	LGU363032G	LGU363035G	LGU363036G	LGFACT600
<b>Four-Pole ⑤</b>					
250	LGU425033G	LGU425032G	LGU425035G	LGU425036G	—
400	LGU440033G	LGU440032G	LGU440035G	LGU440036G	—
600	LGU460033G	LGU460032G	LGU460035G	LGU460036G	—
630 ④	LGU463033G	LGU463032G	LGU463035G	LGU463036G	—

**IC Rating: 200 kAIC at 415 Vac and 480 Vac, Current Limiting Per UL 489**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG ② Catalog Number
<b>Three-Pole ③</b>					
250	LGX325033G	LGX325032G	LGX325035G	LGX325036G	LGFACT250
400	LGX340033G	LGX340032G	LGX340035G	LGX340036G	LGFACT400
600	LGX360033G	LGX360032G	LGX360035G	LGX360036G	LGFACT600
630 ④	LGX363033G	LGX363032G	LGX363035G	LGX363036G	LGFACT600
<b>Four-Pole ⑤</b>					
250	LGX425033G	LGX425032G	LGX425035G	LGX425036G	—
400	LGX440033G	LGX440032G	LGX440035G	LGX440036G	—
600	LGX460033G	LGX460032G	LGX460035G	LGX460036G	—
630 ④	LGX463033G	LGX463032G	LGX463035G	LGX463036G	—

**Notes**

- ① Replace suffix "G" with "W" for no line and load terminals.  
 ② Required for four-wire systems if neutral protection is desired.  
 ③ For two-pole applications, use two outer poles.  
 ④ 630 amperes is not a UL or CSA listed rating. 600 amperes is the maximum UL and CSA listed rating for the LG.  
 ⑤ Neutral protection: 4 = 0%, 6 = 60%, 7 = 100%. Electronic trip unit neutral protection is not adjustable.

**LG 100% Rated Circuit Breaker—Thermal-Magnetic Trip Unit**

**Complete Breaker (Includes Frame, Trip Unit, Standard Terminals and Mounting Hardware)**

**LG-Frame**



**LG-Frame—630 Amperes (600 Amperes UL, CSA) IC Rating: 35 kAIC at 415 and 480 Vac <sup>①</sup>**

Ampere Rating	Three-Pole <sup>②</sup> Fixed Thermal, Adjustable Magnetic Catalog Number
250	LGE3250FAGC
300	LGE3300FAGC
320	—
350	LGE3350FAGC
400	LGE3400FAGC
500	LGE3500FAGC
600	LGE3600FAGC
630 <sup>④</sup>	—

**LG-Frame—630 Amperes (600 Amperes UL, CSA) IC Rating: 50 kAIC at 415 and 480 Vac <sup>①</sup>**

Ampere Rating	Three-Pole <sup>②</sup> Fixed Thermal, Adjustable Magnetic Catalog Number
250	LGS3250FAGC
300	LGS3300FAGC
320	—
350	LGS3350FAGC
400	LGS3400FAGC
500	LGS3500FAGC
600	LGS3600FAGC
630 <sup>④</sup>	—

**LG-Frame—630 Amperes (600 Amperes UL, CSA) IC Rating: 70 kAIC at 415, 65 kAIC at 480 Vac <sup>①</sup>**

Ampere Rating	Three-Pole <sup>②</sup> Fixed Thermal, Adjustable Magnetic Catalog Number
250	LGH3250FAGC
300	LGH3300FAGC
320	—
350	LGH3350FAGC
400	LGH3400FAGC
500	LGH3500FAGC
600	LGH3600FAGC
630 <sup>④</sup>	—

**Notes**

- <sup>①</sup> Replace suffix "G" with "W" for no line and load terminals.
- <sup>②</sup> For two-pole applications, use two outer poles.

# 2.2

## Molded Case Circuit Breakers

### Series G

#### LG 100% Rated Electronic Breaker Per UL 489

##### IEC/UL/CSA 35 kAIC at 415 and 480 Vac

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
250	LGE325033GC	LGE325032GC	LGE325035GC	LGE325036GC	LGFACT250
400	LGE340033GC	LGE340032GC	LGE340035GC	LGE340036GC	LGFACT400
600	LGE360033GC	LGE360032GC	LGE360035GC	LGE360036GC	LGFACT600
630 <sup>②</sup>	LGE363033GC	LGE363032GC	LGE363035GC	LGE363036GC	LGFACT600

##### IEC/UL/CSA 50 kAIC at 415 and 480 Vac

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
250	LGS325033GC	LGS325032GC	LGS325035GC	LGS325036GC	LGFACT250
400	LGS340033GC	LGS340032GC	LGS340035GC	LGS340036GC	LGFACT400
600	LGS360033GC	LGS360032GC	LGS360035GC	LGS360036GC	LGFACT600
630 <sup>②</sup>	LGS363033GC	LGS363032GC	LGS363035GC	LGS363036GC	LGFACT600

##### IEC/UL/CSA 70 kAIC at 415 and 480 Vac

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
250	LGH325033GC	LGH325032GC	LGH325035GC	LGH325036GC	LGFACT250
400	LGH340033GC	LGH340032GC	LGH340035GC	LGH340036GC	LGFACT400
600	LGH360033GC	LGH360032GC	LGH360035GC	LGH360036GC	LGFACT600
630 <sup>②</sup>	LGH363033GC	LGH363032GC	LGH363035GC	LGH363036GC	LGFACT600

#### Notes

<sup>①</sup> Required for four-wire systems if neutral protection is required.

<sup>②</sup> 630 amperes is not a UL or CSA listed rating. 600 amperes is the maximum UL and CSA listed rating for the LG.

**LG Electronic Breaker with Arcflash Reduction Maintenance System**

Series G LG circuit breakers are available with the Arcflash Reduction Maintenance System™ integrated into the electronic trip units helping to improve safety by providing a

simple and reliable method to reduce fault clearing time. The Arcflash Reduction Maintenance System unit utilizes a separate analog trip circuit that provides faster

interruption times than the standard (digital) “instantaneous” protection. Work locations downstream of a circuit breaker with an Arcflash Reduction

Maintenance System unit can have a significantly lower incident energy level, reducing arc flash potential to the system.

**LG with Arcflash Reduction Maintenance System**



**LG Electronic Breaker with Arcflash Reduction Maintenance System**

Ampere Rating	ALSI Catalog Number	ALSIG Catalog Number	Neutral CT for LSG and LSIG ① Catalog Number
<b>IEC/UL/CSA 35 kAIC at 415 and 480 Vac</b>			
250	LGE325038G	LGE365039G	LGFACT250
400	LGE340038G	LGE340039G	LGFACT400
600	LGE360038G	LGE360039G	LGFACT600
630	LGE363038G	LGE363039G	LGFACT600
<b>IEC/UL/CSA 50 kAIC at 415 and 480 Vac</b>			
250	LGS325038G	LGS365039G	LGFACT250
400	LGS340038G	LGS340039G	LGFACT400
600	LGS360038G	LGS360039G	LGFACT600
630	LGS363038G	LGS363039G	LGFACT600
<b>IEC/UL/CSA 70 kAIC at 415 and 480 Vac</b>			
250	LGH325038G	LGH365039G	LGFACT250
400	LGH340038G	LGH340039G	LGFACT400
600	LGH360038G	LGH360039G	LGFACT600
630	LGH363038G	LGH363039G	LGFACT600
<b>IEC/UL/CSA 100 kAIC at 415 and 480 Vac, Current Limiting Per UL 489</b>			
250	LGC325038G	LGC365039G	LGFACT250
400	LGC340038G	LGC340039G	LGFACT400
600	LGC360038G	LGC360039G	LGFACT600
630	LGC363038G	LGC363039G	LGFACT600
<b>IEC/UL/CSA 150 kAIC at 415 and 480 Vac, Current Limiting Per UL 489</b>			
250	LGU325038G	LGU365039G	LGFACT250
400	LGU340038G	LGU340039G	LGFACT400
600	LGU360038G	LGU360039G	LGFACT600
630	LGU363038G	LGU363039G	LGFACT600
<b>IEC/UL/CSA 200 kAIC at 415 and 480 Vac, Current Limiting Per UL 489</b>			
250	LGX325038G	LGX365039G	LGFACT250
400	LGX340038G	LGX340039G	LGFACT400
600	LGX360038G	LGX360039G	LGFACT600
630	LGX363038G	LGX363039G	LGFACT600

**LG Electronic Trip Units with Arcflash Reduction Maintenance System**

Ampere Rating	ALSI Catalog Number	ALSIG Catalog Number	Neutral CT for LSG and LSIG ① Catalog Number
250	LT325038	LT325039	LGFACT250
400	LT340038	LT340039	LGFACT400
600	LT360038	LT360039	LGFACT600
630	LT363038	LT363039	LGFACT600

**Note**

① Required for four-wire systems if neutral protection is required.

## Accessories Selection Guide and Ordering Information

## 2

## Line and Load Terminals

Maximum Breaker Amperes	Terminal Body Material	Wire Type	AWG Wire Range/ Number of Conductors	Metric Wire Range (mm <sup>2</sup> )	Number of Terminals Included	Catalog Number
400	Aluminum	Cu/Al	500–750 (1)	240–380 (1)	3	3TA631LK <sup>①</sup>
400	Aluminum	Cu/Al	500–750 (1)	240–380 (1)	4	4TA631LK <sup>①</sup>
400	Copper	Cu	500–750 (1)	240–380 (1)	3	3T631LK <sup>①</sup>
400	Copper	Cu	500–750 (1)	240–380 (1)	4	4T631LK <sup>①</sup>
630	Aluminum	Cu/Al	2–500 (2)	35–240 (2)	1	TA632L
630	Aluminum	Cu/Al	2–500 (2)	35–240 (2)	3	3TA632LK <sup>①②</sup>
630	Aluminum	Cu/Al	2–500 (2)	35–240 (2)	4	4TA632LK <sup>①②</sup>
630	Copper	Cu	2–500 (2)	35–240 (2)	3	3T632LK <sup>①</sup>
630	Copper	Cu	2–500 (2)	35–240 (2)	4	4T632LK <sup>①</sup>
400	Aluminum	Cu/Al	3–500 (1)	35–240 (1)	1	TA350LK <sup>②</sup>
400	Copper	Cu	3–500 (1)	35–240 (1)	1	T350LK

## Base Mounting Hardware

Base mounting hardware is included with a circuit breaker or molded case switch. (Included with breaker.) If required separately, order 66A4560G03.

## Terminal Covers

Description	Catalog Number
Three-pole terminal cover <sup>③</sup>	LTS3K
Four-pole terminal cover <sup>③</sup>	LTS4K

## End Cap Kits (MIO Metric Nuts)

Number of Poles	Catalog Number
3	L3RTWK
4	L4RTWK

## Control Wire Terminal Kit

Description	Terminal Body Type	Catalog Number
Three-pole kit	Aluminum	3TA632LKW
Four-pole kit	Aluminum	4TA632LKW
Three-pole kit	Copper	3T632LKW
Four-pole kit	Copper	4T632LKW

## Terminal Spreaders

Number of Poles	Catalog Number
3	LGTEW3
4	LGTEW4

## Terminal Extensions

Number of Poles	Catalog Number
3	LGTES3
4	LGTES4

## Handle Extension

Description	Catalog Number
Handle extension	HEXLG

## Interphase Barrier

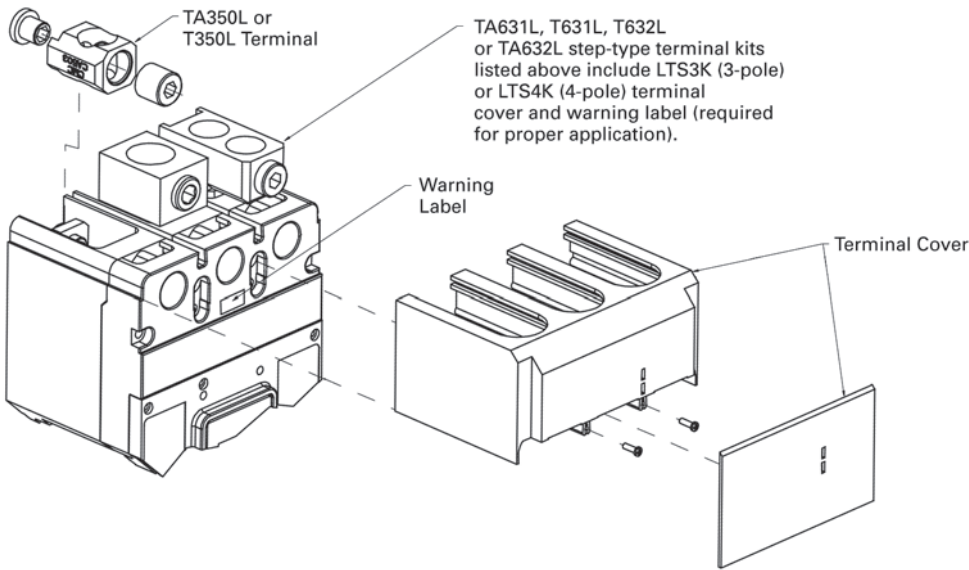
Package of 2	Catalog Number
Interphase barrier	IPB3

## Notes

- ① Includes LTS3K (three-pole) or LTS4K (four-pole) terminal covers.
- ② Standard terminal included with complete breaker.
- ③ Included in TA631L, T631L, TA632L kits listed above.

## Terminals and Terminal Cover for the LG Breaker—Includes LTS3K (Three-Pole) or LTS4K (Four-Pole) Terminal Covers

**Note:** Extended terminal covers add 2.13 inches (54.0 mm) to breaker length.





## Accessories

## 2

**Base Mounting Hardware**

Base mounting hardware is included with a circuit breaker or molded case switch. (Included with breaker.) If required separately, order 66A4560G03.

**Allowable Accessory Combinations**

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

**LG-Frame Accessories**

Description	Reference Page	Three-Pole			Four-Pole			Neu.
		Left	Center	Right	Left	Center	Right	
<b>Internal Accessories (Only One Internal Accessory Per Pole)</b>								
Alarm lockout (Make/Break)	V4-T2-104			■			■	
Auxiliary switch (1A, 1B)	V4-T2-104			■			■	
Auxiliary switch (2A, 2B)	V4-T2-104			■			■	
Auxiliary switch and alarm switch combination	V4-T2-104			■			■	
Shunt trip—standard	V4-T2-104	■			■			
Undervoltage release mechanism	V4-T2-105	■			■			
<b>External Accessories</b>								
End cap kit	V4-T2-56	●			●			
Handle extension	V4-T2-56	●			●			
Terminal cover	V4-T2-56	●			●			
Padlockable handle block	V4-T2-102		■			■		
Padlockable handle lock hasp	V4-T2-102	□		□	□		□	
Key interlock kit	V4-T2-102	□		□	□		□	
Sliding bar interlock—requires two breakers	V4-T2-102	●	●	●	●	●	●	●
Electrical operator	V4-T2-102	●	●	●	●	●	●	●
Plug-in adapters	V4-T2-102	●	●	●	●	●	●	●
Rear connecting studs	V4-T2-102	●	●	●	●	●	●	●
Handle mechanisms	V4-T2-407	●	●	●	●	●	●	●
Earth leakage/ground fault protector	V4-T2-87	●	●	●	●	●	●	●
Drawout cassette	V4-T2-109	●	●	●	●	●	●	●
Digitrip 310+ test kit	V4-T2-50	●	●	●	●	●	●	●
Ammeter/cause of trip display	V4-T2-101	●	●	●	●	●	●	●
Cause of trip LED module	V4-T2-101	●	●	●	●	●	●	●
<b>Modifications (Refer to Eaton)</b>								
Moisture fungus treatment	V4-T2-100	●	●	●	●	●	●	●
Freeze-tested circuit breakers	—	●	●	●	●	●	●	●
Marine/naval application, UL 489 Supplement SA and SB	①	●	●	●	●	●	●	●

**Legend**

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

**Note**

① Contact Eaton.

**Technical Data and Specifications**

**Interrupting Capacity Ratings**

**UL 489/IEC 60947-2 Interrupting Capacity Ratings**

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA rms Symmetrical Amperes) (kA)									
		Volts AC (50/60 Hz)						Volts DC <sup>①</sup>			
		240–240		380–415		480	600	690	250 <sup>②③</sup>		
		I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>
LGE630	3, 4	65	65	35	35	35	18	12	6	22	22
LGS630	3, 4	85	85	50	50	50	25	20	10	22	22
LGH630	3, 4	100	100	70	70	65	35	25	13	42	42
LGC630 <sup>④</sup>	3, 4	200	200	100	100	100	50	30	15	42	42
LGU630 <sup>④</sup>	3, 4	200	200	150	150	150	65	35	18	50	50
LGX630 <sup>④</sup>	3, 4	200 <sup>⑤</sup>	200	200	200	200	65	35	18	50	50

**Dimensions and Weights**

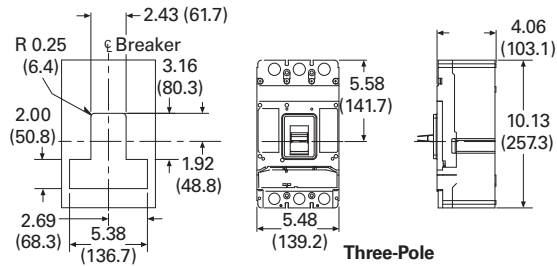
Approximate Dimensions in Inches (mm)

**LG-Frame**

Number of Poles	Width	Height	Depth
2, 3	5.48 (139.2)	10.13 (257.3)	4.09 (103.9)
4	7.22 (183.4)	10.13 (257.3)	4.09 (103.9)

**LG-Frame**

**Note:** TA631L, T631L, T632L, TA632L terminals add 1.19 inches (30.2 mm) to line or load side of LG. LTS3K or LTS4K terminal covers add 2.13 inches (54.1 mm) to line or load side of LG.



Approximate Shipping Weight in Lbs (kg)

**LG-Frame**

Breaker Type	Two- and Three-Pole	Four-Pole
LGE, LGS, LGH, LGC, LGU, LGX	16 (7.3)	20 (9.1)

**Notes**

- ① DC rating apply to substantially non-inductive circuits.
- ② Two-pole circuit breaker, or two poles of three-pole circuits.
- ③ Time constant is 3 milliseconds minimum at 10 kA and 8 milliseconds minimum at–kA.
- ④ Three-poles in series. 750 Vdc ratings available (four-pole in series, not UL listed). Contact Eaton.
- ⑤ IEC rating is 300 kA at 240 Vac.
- ⑥ Current limiting per UL 489.

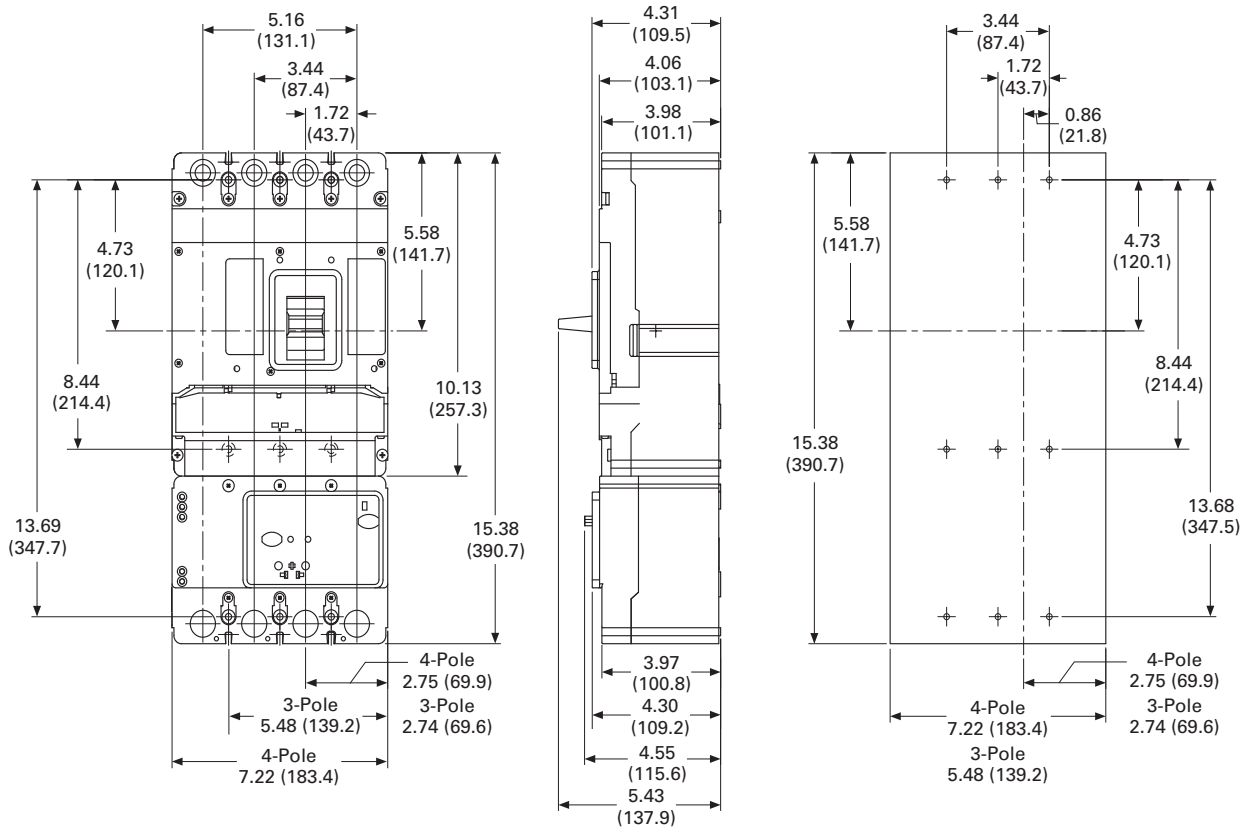
# 2.2

## Molded Case Circuit Breakers

### Series G

#### LG-Frame With Earth Leakage Module

2



**NG-Frame (1200 Ampere)**



**Contents**

<i>Description</i>	<i>Page</i>
EG-Frame (15–125 Amperes) . . . . .	<b>V4-T2-15</b>
JG-Frame (63–250 Amperes) . . . . .	<b>V4-T2-29</b>
LG-Frame (250–630 Amperes) . . . . .	<b>V4-T2-45</b>
NG-Frame (320–1200 Amperes)	
Catalog Number Selection . . . . .	<b>V4-T2-62</b>
Product Selection Guide and Ordering Information . . . . .	<b>V4-T2-63</b>
Accessories . . . . .	<b>V4-T2-66</b>
Technical Data and Specifications . . . . .	<b>V4-T2-67</b>
Dimensions and Weights . . . . .	<b>V4-T2-69</b>
RG-Frame (800–2500 Amperes) . . . . .	<b>V4-T2-70</b>
Motor Circuit Protectors (MCP) . . . . .	<b>V4-T2-80</b>
Motor Protector Circuit Breakers (MPCB) . . . . .	<b>V4-T2-84</b>
30 mA Ground Fault (Earth Leakage) Module . . . . .	<b>V4-T2-87</b>
Current Limiting Circuit Breaker Module . . . . .	<b>V4-T2-91</b>
High Instantaneous Circuit Breaker for Selective Coordination . . . . .	<b>V4-T2-96</b>
Special Features and Accessories . . . . .	<b>V4-T2-99</b>
Motor Operators . . . . .	<b>V4-T2-106</b>
Plug-In Blocks . . . . .	<b>V4-T2-108</b>
Drawout Cassette . . . . .	<b>V4-T2-109</b>

**NG-Frame (320–1200 Amperes)**

**Product Description**

- All Eaton NG-Frame circuit breakers are suitable for reverse feed use
- All NG-Frame circuit breakers are HACR rated

# 2.2

## Molded Case Circuit Breakers

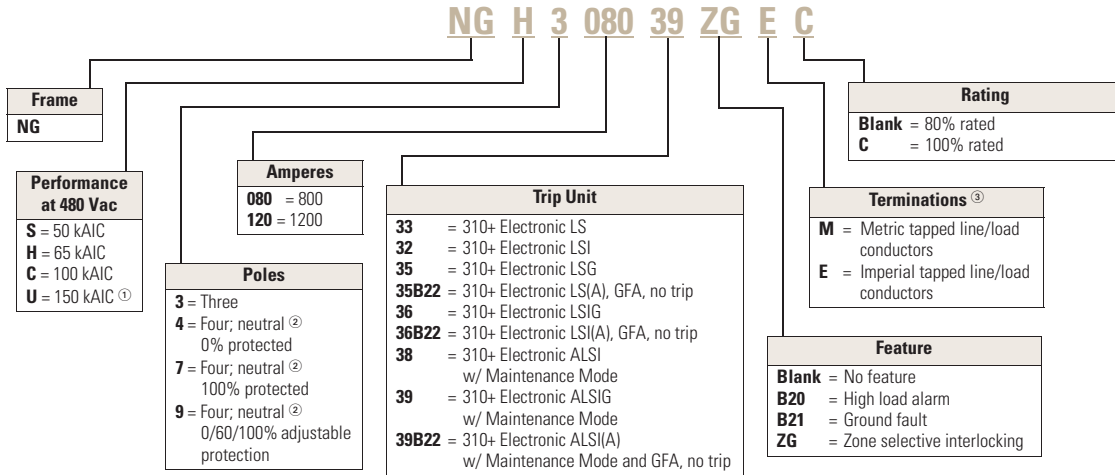
### Series G

#### Catalog Number Selection

This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

2

#### Circuit Breaker/Frame Catalog Number System



#### Notes

- ① 800A only.
  - ② Neutral inn left pole on GN; right pole on NG.
  - ③ Breakers do not ship with lugs.
- Trip units are factory installable only.

## Product Selection Guide and Ordering Information

Type NGS Standard Interrupting Capacity— $U_e$  Max. 690 Vac, 50 kA  $I_{cu}$  at 480 Vac or 415 Vac

2

Maximum Continuous Ampere Rating at 40°C ①②	Number of Poles	Circuit Breaker Frame Including Digitrip RMS 310+ Electronic Trip Unit with Imperial Tapped Conductors					
		LS	LSI	LSG	LSIG	ALSI	ALSIG
Short Time Range		2–8 x $I_n$	2–8 x $I_n$	2–8 x $I_n$	2–8 x $I_n$	2–8 x $I_n$	2–8 x $I_n$
Short Time Delay		—	l–300 ms	—	l–300 ms	l–300 ms	l–300 ms
Ground Fault Pickup		—	—	200–1200A	200–1200A	—	200–1200A
Ground Fault Delay		—	—	l–500 ms	l–500 ms	—	l–500 ms
800	3	NGS308033E	NGS308032E	NGS308035E	NGS308036E	NGS308038E	NGS308039E
	4④	NGS408033E	NGS408032E	NGS408035E	NGS408036E	NGS408038E	NGS408039E
	4⑤	NGS708033E	NGS708032E	—	—	NGS708038E	—
	4⑥	NGS908033E	NGS908032E	—	—	NGS908038E	—
1200 ③	3	NGS312033E	NGS312032E	NGS312035E	NGS312036E	NGS312038E	NGS312039E
	4④	NGS412033E	NGS412032E	NGS412035E	NGS412036E	—	NGS412039E
	4⑤	NGS712033E	NGS712032E	—	—	NGS712038E	—
	4⑥	NGS912033E	NGS912032E	—	—	NGS912038E	—

Type NGS Standard Interrupting Capacity— $U_e$  Max. 690 Vac, 50 kA  $I_{cu}$  at 415 Vac

Maximum Continuous Ampere Rating at 40°C ①②	Number of Poles	Circuit Breaker Frame Including Digitrip RMS 310+ Electronic Trip Unit with Metric Tapped Conductors					
		LS	LSI	LSG	LSIG	ALSI	ALSIG
Short Time Range		2–8 x $I_n$	2–8 x $I_n$	2–8 x $I_n$	2–8 x $I_n$	2–8 x $I_n$	2–8 x $I_n$
Short Time Delay		—	l–300 ms	—	l–300 ms	l–300 ms	l–300 ms
Ground Fault Pickup		—	—	200–1200A	200–1200A	—	200–1200A
Ground Fault Delay		—	—	l–500 ms	l–500 ms	—	l–500 ms
1600 ③	3	NGS316033M	NGS316032M	NGS316035M	NGS316036M	NGS316038M	NGS316039M
	4④	NGS416033M	NGS416032M	NGS416035M	NGS416036M	NGS416038M	NGS416039M
	4⑤	NGS716033M	NGS716032M	—	—	NGS716038M	—
	4⑥	NGS916033M	NGS916032M	—	—	NGS916038M	—

## Molded Case Switches ⑦⑧

$U_e$ Maximum 690 Vac		Catalog Number	
Ampere Rating	Three-Pole	Four-Pole	Catalog Number
800	MCS with Imperial line and load terminals	NGK3080KSE	NGK4080KSE
1200	MCS with Imperial line and load terminals	NGK3120KSE	NGK4120KSE
1250	MCS with Imperial line and load terminals	NGK3125KSE	NGK43125KSE

## Notes

- ① For AC use only.
- ② NG MCCBs are suitable for 40°C or 50°C applications. Order suffix V3 to eliminate standard 40°C labeling.
- ③ Non-UL listed NG 1250 with 1250 ampere trip unit is also available.
- ④ Neutral 0% protected. NG, neutral in right pocket; GN, neutral in left pocket.
- ⑤ Neutral 100% protected (denoted by 7 in digit four).
- ⑥ Neutral 0%/60%/100% adjustable protection (denoted by 9 in digit four).
- ⑦ For AC use only. Molded case switch will trip above 14,000 amperes.
- ⑧ For two-pole applications, use outer poles of three-pole molded case switch.

# 2.2

## Molded Case Circuit Breakers

### Series G

2

#### Type NGH High Interrupting Capacity— $U_e$ Max. 690 Vac, 65 kA $I_{cu}$ at 480 Vac or 415 Vac

Maximum Continuous Ampere Rating at 40°C ①②	Number of Poles	Circuit Breaker Frame Including Digitrip Electronic Trip Unit					
		LS	LSI	LSG	LSIG	ALSI	ALSIG
		2–8 x $I_n$	2–8 x $I_n$ 1–300 ms	2–8 x $I_n$	2–8 x $I_n$ 1–300 ms	2–8 x $I_n$ 1–300 ms	2–8 x $I_n$ 1–300 ms
		—	—	200–1200A	200–1200A	—	200–1200A
		—	—	1–500 ms	1–500 ms	—	1–500 ms
800	3	NGH308033E	NGH308032E	NGH308035E	NGH308036E	NGH308038E	NGH308039E
	4 ③	NGH408033E	NGH408032E	NGH408035E	NGH408036E	NGH408038E	NGH408039E
	4 ④	NGH708033E	NGH708032E	—	—	NGH708038E	—
	4 ⑤	NGH908033E	NGH908032E	—	—	NGH908038E	—
1200	3	NGH312033E	NGH312032E	NGH312035E	NGH312036E	NGH312038E	NGH312039E
	4 ③	NGH412033E	NGH412032E	NGH412035E	NGH412036E	—	NGH412039E
	4 ④	NGH712033E	NGH712032E	—	—	NGH712038E	—
	4 ⑤	NGH912033E	NGH912032E	—	—	NGH912038E	—

#### Type NGC Very High Capacity— $U_e$ Max. 690 Vac, 100 kA $I_{cu}$ at 480 Vac or 415 Vac

Maximum Continuous Ampere Rating at 40°C ①②	Number of Poles	Circuit Breaker Frame Including Digitrip RMS 310+ Electronic Trip Unit with Imperial Tapped Conductors					
		LS	LSI	LSG	LSIG	ALSI	ALSIG
		2–8 x $I_n$	2–8 x $I_n$ 1–300 ms	2–8 x $I_n$	2–8 x $I_n$ 1–300 ms	2–8 x $I_n$ 1–300 ms	2–8 x $I_n$ 1–300 ms
		—	—	200–1200A	200–1200A	—	200–1200A
		—	—	1–500 ms	1–500 ms	—	1–500 ms
800	3	NGC308033E	NGC308032E	NGC308035E	NGC308036E	NGC308038E	NGC308039E
	4 ③	NGC408033E	NGC408032E	NGC408035E	NGC408036E	NGC408038E	NGC408039E
	4 ④	NGC708033E	NGC708032E	—	—	NGC708038E	—
	4 ⑤	NGC908033E	NGC908032E	—	—	NGC908038E	—
1200 ③	3	NGC312033E	NGC312032E	NGC312035E	NGC312036E	NGC312038E	NGC312039E
	4 ③	NGC412033E	NGC412032E	NGC412035E	NGC412036E	—	NGC412039E
	4 ④	NGC712033E	NGC712032E	—	—	NGC712038E	—
	4 ⑤	NGC912033E	NGC912032E	—	—	NGC912038E	—

#### Notes

- ① For AC use only.
- ② NG MCCBs are suitable for 40°C or 50°C applications. Order suffix V3 to eliminate standard 40°C labeling.
- ③ Neutral 0% protected. NG, neutral in right pocket; GN, neutral in left pocket.
- ④ Neutral 100% protected (denoted by 7 in digit four).
- ⑤ Neutral 0%/60%/100% adjustable protection (denoted by 9 in digit four).

## Accessories Selection Guide and Ordering Information

### Line and Load Terminals

N-Frame circuit breakers do not include terminals as standard. When copper or Cu/Al terminals are required, order by catalog number.

### Line and Load Terminals

Maximum Breaker Amperes	Terminal Body Material	Wire Type	AWG Wire (Number of Conductors)	AWG Wire Catalog Number <sup>①</sup>	Metric Wire Range mm <sup>2</sup>	Metric Catalog Number <sup>①</sup>
<b>Standard Cu/Al Pressure Terminals</b>						
700	Aluminum	Cu/Al	1–500 (2)	<b>TA700NB1</b>	50–240	<b>TA700NB1M</b>
1000	Aluminum	Cu/Al	3/0–400 (3)	<b>TA1000NB1</b>	95–185	<b>TA1000NB1M</b>
1200	Aluminum	Cu/Al	4/0–500 (4)	<b>TA1200NB1</b>	120–240	<b>TA1200NB1M</b>
1200	Aluminum	Cu/Al	500–750 (3)	<b>TA1201NB1</b>	300–400	<b>TA1201NB1M</b>
<b>Optional Copper and Cu/Al Pressure Type Terminals</b>						
700	Copper	Cu	2/0–500 (2)	<b>T700NB1</b>	70–240	<b>T700NB1M</b>
1000	Copper	Cu	3/0–500 (3)	<b>T1000NB1</b>	95–240	<b>T1000NB1M</b>
1200	Copper	Cu	3/0–400 (4)	<b>T1200NB3</b>	95–185	<b>T1200NB3M</b>

### Base Mounting Hardware

Base mounting hardware is included with a circuit breaker or molded case switch.

### Base Mounting Hardware <sup>②</sup>

Number of Poles	Description	Catalog Number
Three- and four-pole	Imperial hardware: 0.3125–18 x 1.25 pan-head steel screws and lock washers	<b>BMH5</b>
Three- and four-pole	Metric hardware: M8 pan-head steel screws and lock washers	<b>BMH5M</b>

### Terminal Shield

### Terminal Shield

Description	Catalog Number
Three-pole terminal shield	<b>NTS3K</b>

### Conductor Extension Kit

### Conductor Extension Kit <sup>③</sup>

Description	Catalog Number
Three-pole both ends Metric	<b>5104A24G04</b>
Three-pole both ends English	<b>5104A24G02</b>

### Keeper Nut

Not required on NG-Frame. Terminals are threaded.

### Handle Extension

Included with breaker. Additional handle extensions are available.

### Handle Extension

Description	Catalog Number
Single handle extension	<b>HEX5</b>

### Interphase Barriers

The interphase barriers provide additional electrical clearance between circuit breaker poles for special termination applications. Barriers are high dielectric insulating plates that are installed in the molded slots between the terminals. (Field installation only.)

### Interphase Barriers

Description	Catalog Number
Interphase barriers	<b>IPB5</b>

### Notes

- <sup>①</sup> Single terminals individually packed.
- <sup>②</sup> Metric hardware included with breaker.
- <sup>③</sup> Included as standard on 100% rated 800/1200A breakers.



## Accessories

**Allowable Accessory Combinations**

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

**NG-Frame Accessories**

Description	Reference Page	Three-Pole			Four-Pole			Neu.
		Left	Center	Right	Left	Center	Right	
<b>Internal Accessories (Only One Internal Accessory Per Pole)</b>								
Alarm lockout (Make/Break)	V4-T2-104	●		■	●		■	
Auxiliary switch (1A, 1B)	V4-T2-104	●		■	●		■	
Auxiliary switch (2A, 2B)	V4-T2-104	●		■	●		■	
Auxiliary switch and alarm switch combination	V4-T2-104	●		■	●		■	
Shunt trip—standard	V4-T2-104	■			■			
Undervoltage release mechanism	V4-T2-105	■			■			
<b>External Accessories</b>								
Base mounting hardware	V4-T2-65	●	●	●	●	●	●	●
Interphase barriers	V4-T2-65	●	●	●	●	●	●	●
Non-padlockable handle block	V4-T2-102		■			■		
Padlockable handle lock hasp	V4-T2-102	□		□	□		□	
Key interlock kit	V4-T2-102	□		□	□		□	
Sliding bar interlock—requires two breakers	V4-T2-102	●	●	●				
Electrical operator	V4-T2-102	●	●	●	●	●	●	●
Plug-in adapters	V4-T2-108	●	●	●	●	●	●	●
Rear connecting studs	V4-T2-102	●	●	●	●	●	●	●
Handle mechanisms	V4-T2-407	●	●	●	●	●	●	●
Drawout cassette	V4-T2-109	●	●	●	●	●	●	●
Handle extension	V4-T2-65	●	●	●	●	●	●	●
Ammeter/cause of trip display	V4-T2-101	●	●	●	●	●	●	●
Cause of trip LED module	V4-T2-101	●	●	●	●	●	●	●
Digitrip 310 test kit	V4-T2-102	●	●	●	●	●	●	●
<b>Modifications (Refer to Eaton)</b>								
Moisture fungus treatment	V4-T2-100	●	●	●	●	●	●	●
Freeze-tested circuit breakers	—	●	●	●	●	●	●	●
Marine/Naval application, UL 489 Supplement SA and SB	①	●	●	●	●	●	●	●

**Legend**

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

**Note**

① Contact Eaton.

## Technical Data and Specifications

### Interrupting Capacity Ratings

#### UL 489/IEC 60947-2 Interrupting Capacity Ratings <sup>①</sup>

Circuit Breaker Type	Number of Poles	240 (UL)	Interrupting Capacity (kA Symmetrical Amperes)							
			Volts AC (50/60 Hz)							
			220–240		380–415		480		600	
			I <sub>CU</sub>	I <sub>CS</sub>	I <sub>CU</sub>	I <sub>CS</sub>	480	600	I <sub>CU</sub>	I <sub>CS</sub>
NGS <sup>①</sup>	2, 3, 4	65	85	85	50	50	50	25	20	10
NGH	2, 3, 4	100	100	100	70	50	65	35	25	13
NGC	2, 3, 4	200	200	100	100	50	100	65	35	18

### NG-Frame Digitrip Specifications

#### Specification

Trip Unit Type	Digitrip RMS 310+	
rms sensing	Yes	
<b>Breaker Type</b>		
Frame	N	
Ampere range	320–1200A	
Interrupting rating at 480 volts	50, 65, 100 (kA)	
<b>Protection</b>		
Ordering options	LS, LSG	LSI, LSIG
Fixed rated plug (I <sub>n</sub> )	No	No
Overtemperature trip	Yes	Yes
<b>Long Delay Protection (L)</b>		
Adjustable trip setting (I <sub>n</sub> )	Yes	Yes
Long delay pickup	0.5–1.0 (I <sub>n</sub> )	0.5–1.0 (I <sub>n</sub> )
Long delay time I <sup>2</sup> t	12 seconds	12 seconds
Long delay time I <sup>4</sup> t	No	No
Long delay thermal memory	Yes	Yes
High load alarm	No	No
<b>Short Delay Protection (S)</b>		
Short delay pickup	200–800% x (I <sub>n</sub> )	200–800% x (I <sub>n</sub> )
Short delay time I <sup>2</sup> t	100 ms	No
Short delay time flat	No	Inst–300 ms
Short delay time zone selective interlocking	Yes	Yes
<b>Instantaneous Protection (I)</b>		
Instantaneous pickup	No	200–800% x (I <sub>n</sub> )
Discriminator	No	No
Instantaneous override	Yes	Yes

#### Legend

BIM = Breaker Interface Module  
 (A) = GF Alarm  
 I<sub>S</sub> = Sensor Rating  
 I<sub>n</sub> = Rating Plug  
 I<sub>r</sub> = Long Delay Pickup Setting

#### Note

<sup>①</sup> 1600 amperes is not a UL or CSA listed rating. 1200 amperes is the maximum UL and CSA rating for NG.

## Specifications, continued

2

Trip Unit Type	Digitrip RMS 310+ LS, LSG	LSI, LSIG
<b>Ground Fault Protection (G)</b>		
Ground fault alarm	No	No
Ground fault pickup	1–5 x I <sub>g</sub> (160A)	1–5 x I <sub>g</sub> (160A)
Ground fault delay I <sup>2</sup> t	No	No
Ground fault delay flat	Inst–500 ms	Inst–500 ms
Ground fault zone selective interlocking	Yes	Yes
Ground fault thermal memory	Yes	Yes
<b>System Diagnostics</b>		
Status LEDs	Yes	Yes
Cause of trip LEDs	Yes <sup>①</sup>	Yes <sup>①</sup>
Magnitude of trip information	No	No
Remote signal contact—ground alarm	Yes <sup>②</sup>	Yes <sup>②</sup>
Local auxiliary and bell alarm contact	Optional	Optional
<b>System Monitoring</b>		
Digital display	Yes <sup>③</sup>	Yes <sup>③</sup>
Current	Yes <sup>③</sup>	Yes <sup>③</sup>
Power and energy	No	No
Power quality—harmonics	No	No
Power factor	No	No
<b>Communications</b>		
Eaton PowerNet	No	No
<b>Testing</b>		
Testing method	Test set	Test set

**Legend**

BIM = Breaker Interface Module  
 (A) = GF Alarm  
 I<sub>s</sub> = Sensor Rating  
 I<sub>n</sub> = Rating Plug  
 I<sub>r</sub> = Long Delay Pickup Setting

**Notes**

- <sup>①</sup> With cause of trip LED module (Trip-LED)  
<sup>②</sup> With separate ground fault alarm unit (GFAU).  
<sup>③</sup> With cause of trip display (DIGIVIEW or DIGIVIEWR06)

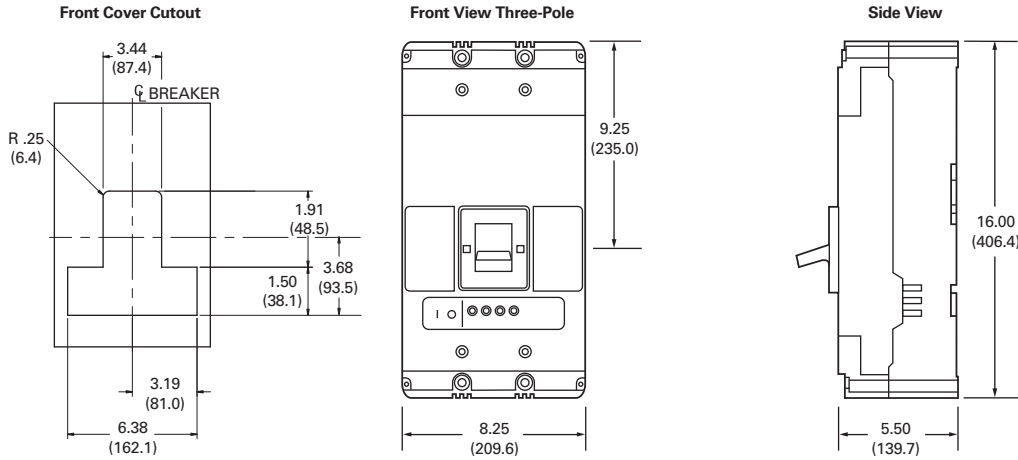
**Dimensions and Weights**

Approximate Dimensions in Inches (mm)

**NG-Frame**

Number of Poles	Width	Height	Depth
3	8.25 (209.6)	16.00 (406.4)	5.50 (139.7)
4	11.13 (282.6)	16.00 (406.4)	5.50 (139.7)

**NG-Frame**



Approximate Shipping Weight in Lbs (kg)

**NG-Frame**

Breaker Type	Complete Breaker	
	Three-Pole	Four-Pole
NGS, NGH, NGC	45 (20.4)	58 (26.3)

#### RG-Frame (800–2500 Amperes)

2



#### Contents

<i>Description</i>	<i>Page</i>
EG-Frame (15–125 Amperes) . . . . .	<b>V4-T2-15</b>
JG-Frame (63–250 Amperes) . . . . .	<b>V4-T2-29</b>
LG-Frame (250–630 Amperes) . . . . .	<b>V4-T2-45</b>
NG-Frame (320–1200 Amperes) . . . . .	<b>V4-T2-61</b>
RG-Frame (800–2500 Amperes)	
Catalog Number Selection . . . . .	<b>V4-T2-71</b>
Product Selection . . . . .	<b>V4-T2-72</b>
Accessories . . . . .	<b>V4-T2-77</b>
Technical Data and Specifications . . . . .	<b>V4-T2-78</b>
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Motor Circuit Protectors (MCP) . . . . .	<b>V4-T2-80</b>
Motor Protector Circuit Breakers (MPCB) . . . . .	<b>V4-T2-84</b>
30 mA Ground Fault (Earth Leakage) Module . . . . .	<b>V4-T2-87</b>
Current Limiting Circuit Breaker Module . . . . .	<b>V4-T2-91</b>
High Instantaneous Circuit Breaker for Selective Coordination . . . . .	<b>V4-T2-96</b>
Special Features and Accessories . . . . .	<b>V4-T2-99</b>
Motor Operators . . . . .	<b>V4-T2-106</b>
Plug-In Blocks . . . . .	<b>V4-T2-108</b>
Drawout Cassette . . . . .	<b>V4-T2-109</b>

#### RG-Frame (800–2500 Amperes)

##### Product Description

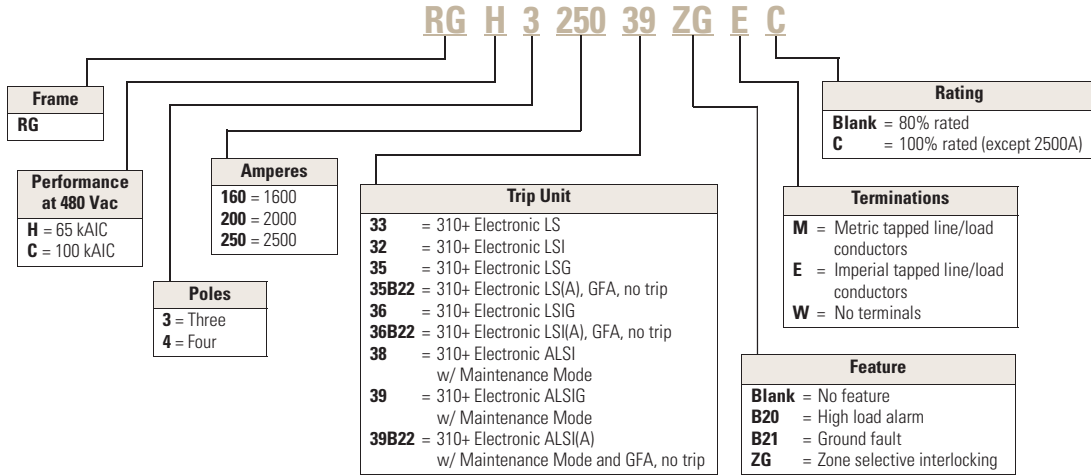
- Eaton's RG-Frame circuit breakers are available as frame (which includes trip unit), rating plug and terminals
- All R-Frame circuit breakers are suitable for reverse feed use

### Catalog Number Selection

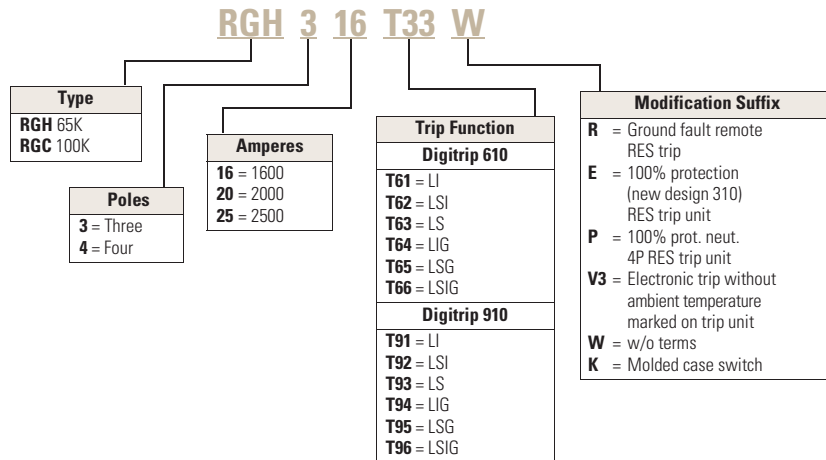
This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

**70 kA at 415 Vac and 65 kA at 480 Vac**

### RG Circuit Breaker/Frame



### RG Circuit Breaker/Frame for OPTIM 610 and 910



#### Product Selection

70 kA at 415 Vac and 65 kA at 480 Vac

2

#### Type RGH with Digitrip 310+ High Interrupting Capacity— $U_e$ Maximum 690 Vac, 70 kA $I_{cu}$ at 415 Vac

Maximum Continuous Ampere Rating at 40°C ①	Number of Poles	Circuit Breaker Frame Including Digitrip RMS 310 Electronic Trip Unit with Adjustable Rating Plugs—Catalog Number ②			
		LS	LSI	LSG ③	LSIG ④
Short Time Range		2–8 x $I_n$	2–8 x $I_n$	2–8 x $I_n$	2–8 x $I_n$
Short Time Delay		—	1–300 ms	—	1–300 ms
Ground Fault Pickup		—	—	200–1200A	200–1200A
Ground Fault Delay		—	—	1–500 ms	1–500 ms
1600 ①	3	RGH316033E	RGH316032E	RGH316035E	RGH316036E
2000	3	RGH320033E	RGH320032E	RGH320035E	RGH320036E
2500	3	RGH325033E	RGH325032E	RGH325035E	RGH325036E

100 kA at Both 415 Vac and 480 Vac

#### Type RGH with Digitrip 310+ High Interrupting Capacity— $U_e$ Maximum 690 Vac, 70 kA $I_{cu}$ at 415 Vac

Maximum Continuous Ampere Rating at 40°C ①	Number of Poles	Circuit Breaker Frame Including Digitrip RMS 310 Electronic Trip Unit with Adjustable Rating Plugs—Catalog Number ②			
		LS	LSI	LSG ③	LSIG ④
Short Time Range		2–8 x $I_n$	2–8 x $I_n$	2–8 x $I_n$	2–8 x $I_n$
Short Time Delay		—	1–300 ms	—	1–300 ms
Ground Fault Pickup		—	—	200–1200A	200–1200A
Ground Fault Delay		—	—	1–500 ms	1–500 ms
1600 ①	4 ④	RGH416033E	RGH416032E	—	—
2000	4 ④	RGH420033E	RGH420032E	—	—
2500	4 ④	RGH425033E	RGH425032E	—	—

#### Notes

- ① For SCR application, use 2000 ampere frame.
  - ② Order terminals separately. Mounting hardware not included.
  - ③ Ground fault equipped trip units available with remote indicating panel. Add “R” to catalog number, for example, “RGH316035RW.”
  - ④ Unprotected left pole neutral. Add “P” to catalog number for 100% protected left pole neutral, add “E” for 60% protected, for example, “RGH416033PW,” “RGH416033EW.”
- RG MCCBs have English threading on line and load conductors. Use suffix “M” for metric threading.

100 kA at Both 415 Vac and 480 Vac

Type RGC with Digitrip 310+ Very High Interrupting Capacity—U<sub>e</sub> Maximum 690 Vac, 100 kA I<sub>cu</sub> at 415 Vac

Maximum Continuous Ampere Rating at 40°C ①	Number of Poles	Circuit Breaker Frame Including Digitrip RMS 310 Electronic Trip Unit with Adjustable Rating Plugs—Catalog Number ②			
		LS	LSI	LSG ③	LSIG ③
Short Time Range		2–8 x I <sub>n</sub>	2–8 x I <sub>n</sub>	2–8 x I <sub>n</sub>	2–8 x I <sub>n</sub>
Short Time Delay		—	1–300 ms	—	1–300 ms
Ground Fault Pickup		—	—	200–1200A	200–1200A
Ground Fault Delay		—	—	1–500 ms	1–500 ms
1600 ①	3	RGC316033E	RGC316032E	RGC316035E	RGC316036E
2000	3	RGC320033E	RGC320032E	RGC320035E	RGC320036E
2500	3	RGC325033E	RGC325032E	RGC325035E	RGC325036E

Type RGC with Digitrip 310+ Very High Interrupting Capacity—U<sub>e</sub> Maximum 690 Vac, 100 kA I<sub>cu</sub> at 415 Vac, continued

Maximum Continuous Ampere Rating at 40°C ①	Number of Poles	Circuit Breaker Frame Including Digitrip RMS 310 Electronic Trip Unit with Adjustable Rating Plugs—Catalog Number ②			
		LS	LSI	LSG ③	LSIG ③
Short Time Range		2–8 x I <sub>n</sub>	2–8 x I <sub>n</sub>	2–8 x I <sub>n</sub>	2–8 x I <sub>n</sub>
Short Time Delay		—	1–300 ms	—	1–300 ms
Ground Fault Pickup		—	—	200–1200A	200–1200A
Ground Fault Delay		—	—	1–500 ms	1–500 ms
1600 ①	4 ④	RGC416033E	RGC416032E	—	—
2000	4 ④	RGC420033E	RGC420032E	—	—
2500	4 ④	RGC425033E	RGC425032E	—	—

Molded Case Switches ⑤

Ampere Rating	Number of Poles	Catalog Number
1600	3	RGK3160KSE
2000	3	RGK3200KSE
1600	4	RGK4160KSE
2000	4	RGK4200KSE

Notes

① For SCR application, use 2000 ampere frame.

② Order terminals separately. Mounting hardware not included.

③ Ground fault equipped trip units available with remote indicating panel. Add "R" to catalog number, for example, "RGH316035RW."

④ Unprotected left pole neutral. Add "P" to catalog number for 100% protected left pole neutral, add "E" for 60% protected, for example, "RGH416033PW," "RGH416033EW."

⑤ Molded case switch will trip above 17,500 amperes.

RG MCCBs have English threading on line and load conductors. Use suffix "M" for metric threading.



# 2.2

## Molded Case Circuit Breakers

### Series G

#### Type RG with Digitrip 610 and 910

2

		Circuit Breaker Frame Including Digitrip RMS 610 and 910 Electronic Trip Unit with Rating Plugs Order as Individual Component—Catalog Number ①						Digitrip RMS Interchangeable Rating Plug (Order as Individual Component)			
Maximum Continuous Ampere Rating at 40°C	Number of Poles	L – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time						Fixed Rating Plug	Ampere Rating	Catalog Number	
		LI	LS	LSI	LIG	LSG	LSIG				
<b>Long Delay Pickup</b>		0.5–1.0 x $I_n$	0.5–1.0 <sub>n</sub>	0.5–1.0 x $I_n$	0.5–1.0 x $I_n$	0.5–1.0 x $I_n$	0.5–1.0 x $I_n$				
<b>Long Delay Time</b>		2–24 Seconds	2–24 Seconds	2–24 Seconds	2–24 Seconds	2–24 Seconds	2–24 Seconds				
<b>Short Time Range</b>		2–6 x $I_T$	2–6 x $I_T$	2–6 x $I_T$	2–6 x $I_T$	2–6 x $I_T$	2–6 x $I_T$				
<b>Short Time Delay</b>		—	100–500 ms	100–500 ms	—	100–500 ms	100–500 ms				
<b>Instantaneous</b>		2–6 x M1 and M2	—	2–6 x M1 and M2	2–6 x M1 and M2	—	2–6 x M1 and M2				
<b>Ground Fault Pickup</b>		—	—	—	0.25–1.0 x $I_n$ ②	—	0.25–1.0 x $I_n$ ②				
<b>Ground Fault Delay</b>		—	—	—	100–500 ms	—	100–500 ms				
<b>Type RGH with Digitrip 610 High Interrupting Capacity—<math>U_e</math> Max. 690 Vac, 70 kA <math>I_{cu}</math> at 415 Vac</b>											
1600	3	RGH316T61WP44	RGH316T63WP44	RGH316T62WP44	RGH316T64WP44	RGH316T65WP44	RGH316T66WP44	800	RP6R16A080		
								1000	RP6R16A100		
								1200	RP6R16A120		
								1250	RP6R16A125		
								1600	RP6R16A160		
		Includes 1600A rating plug									
2000	3	RGH320T61WP49	RGH320T63WP49	RGH320T62WP49	RGH320T64WP49	RGH320T65WP49	RGH320T66WP49	1000	RP6R20A100		
								1200	RP6R20A120		
								1250	RP6R20A125		
								1600	RP6R20A160		
								2000	RP6R20A200		
		Includes 2000A rating plug									
2500	3	RGH325T61WP53	RGH325T63WP53	RGH325T62WP53	RGH325T64WP53	RGH325T65WP53	RGH325T66WP53	1600	RP6R25A160		
								2000	RP6R25A200		
								2500	RP6R25A250		
<b>Type RGC with Digitrip 610 Very High Interrupting Capacity—<math>U_e</math> Max. 690 Vac, 100 kA <math>I_{cu}</math> at 415 Vac</b>											
1600	3	RGC316T61WP44	RGC316T63WP44	RGC316T62WP44	RGC316T64WP44	RGC316T65WP44	RGC316T66WP44	800	RP6R16A080		
								1000	RP6R16A100		
								1200	RP6R16A120		
								1250	RP6R16A125		
								1600	RP6R16A160		
		Includes 1600A rating plug									
2000	3	RGC320T61WP49	RGC320T63WP49	RGC320T62WP49	RGC320T64WP49	RGC320T65WP49	RGC320T66WP49	1000	RP6R20A100		
								1200	RP6R20A120		
								1250	RP6R20A125		
								1600	RP6R20A160		
								2000	RP6R20A200		
		Includes 2000A rating plug									
2500	3	RGC325T61WP53	RGC325T63WP53	RGC325T62WP53	RGC325T64WP53	RGC325T65WP53	RGC325T66WP53	1600	RP6R25A160		
								2000	RP6R25A200		
								2500	RP6R25A250		
		Includes 2500A rating plug									

#### Notes

① Order terminals separately. Mounting hardware not included.

② Not to exceed 1200 ampere ground fault pickup.

RG MCCBs have metric threading on line and load conductors. Use RD MCCBs if imperial threading is required.

Type RG with Digitrip 610 and 910, continued

Maximum Continuous Ampere Rating at 40°C	Number of Poles	Circuit Breaker Frame Including Digitrip RMS 610 and 910 Electronic Trip Unit with Rating Plugs Order as Individual Component—Catalog Number ①						Digitrip RMS Interchangeable Rating Plug (Order as Individual Component)		
		LI	LS	LSI	LIG	LSG	LSIG	Fixed Rating Plug	Ampere Rating	Catalog Number
Long Delay Pickup		0.5–1.0 x I <sub>n</sub>	0.5–1.0 <sub>n</sub>	0.5–1.0 x I <sub>n</sub>	0.5–1.0 x I <sub>n</sub>	0.5–1.0 x I <sub>n</sub>	0.5–1.0 x I <sub>n</sub>			
Long Delay Time		2–24 Seconds	2–24 Seconds	2–24 Seconds	2–24 Seconds	2–24 Seconds	2–24 Seconds			
Short Time Range		2–6 x I <sub>t</sub>	2–6 x I <sub>t</sub>	2–6 x I <sub>t</sub>	2–6 x I <sub>t</sub>	2–6 x I <sub>t</sub>	2–6 x I <sub>t</sub>			
Short Time Delay		—	100–500 ms	100–500 ms	—	100–500 ms	100–500 ms			
Instantaneous		2–6 x M1 and M2	—	2–6 x M1 and M2	2–6 x M1 and M2	—	2–6 x M1 and M2			
Ground Fault Pickup		—	—	—	0.25–1.0 x I <sub>n</sub> ②	—	0.25–1.0 x I <sub>n</sub> ②			
Ground Fault Delay		—	—	—	100–500 ms	—	100–500 ms			

Type RGH with Digitrip 910 High Interrupting Capacity—U<sub>e</sub> Max. 690 Vac, 70 kA I<sub>cu</sub> at 415 Vac

1600	3	RGH316T91WP44	RGH316T93WP44	RGH316T92WP44	RGH316T94WP44	RGH316T95WP44	RGH316T96WP44	800	RP6R16A080
								1000	RP6R16A100
								1200	RP6R16A120
								1250	RP6R16A125
								1600	RP6R16A160
Includes 1600A rating plug									
2000	3	RGH320T91WP49	RGH320T93WP49	RGH320T92WP49	RGH320T94WP49	RGH320T95WP49	RGH320T96WP49	1000	RP6R20A100
								1200	RP6R20A120
								1250	RP6R20A125
								1600	RP6R20A160
								2000	RP6R20A200
Includes 2000A rating plug									
2500	3	RGH325T91WP53	RGH325T93WP53	RGH325T92WP53	RGH325T94WP53	RGH325T95WP53	RGH325T96WP53	1600	RP6R25A160
								2000	RP6R25A200
								2500	RP6R25A250
Includes 2500A rating plug									

Type RGC with Digitrip 910 Very High Interrupting Capacity—U<sub>e</sub> Max. 690 Vac, 100 kA I<sub>cu</sub> at 415 Vac

1600	3	RGC316T91WP44	RGC316T93WP44	RGC316T92WP44	RGC316T94WP44	RGC316T95WP44	RGC316T96WP44	800	RP6R16A080
								1000	RP6R16A100
								1200	RP6R16A120
								1250	RP6R16A125
								1600	RP6R16A160
Includes 1600A rating plug									
2000	3	RGC320T91WP49	RGC320T93WP49	RGC320T92WP49	RGC320T94WP49	RGC320T95WP49	RGC320T96WP49	1000	RP6R20A100
								1200	RP6R20A120
								1250	RP6R20A125
								1600	RP6R20A160
								2000	RP6R20A200
Includes 2000A rating plug									
2500	3	RGC325T91WP53	RGC325T93WP53	RGC325T92WP53	RGC325T94WP53	RGC325T95WP53	RGC325T96WP53	1600	RP6R25A160
								2000	RP6R25A200
								2500	RP6R25A250
Includes 2500 A rating plug									

Notes

- ① Order terminals separately. Mounting hardware not included.
- ② Not to exceed 1200 ampere ground fault pickup.

RG MCCBs have metric threading on line and load conductors. Use RD MCCBs if imperial threading is required.

### Accessories Selection Guide and Ordering Information

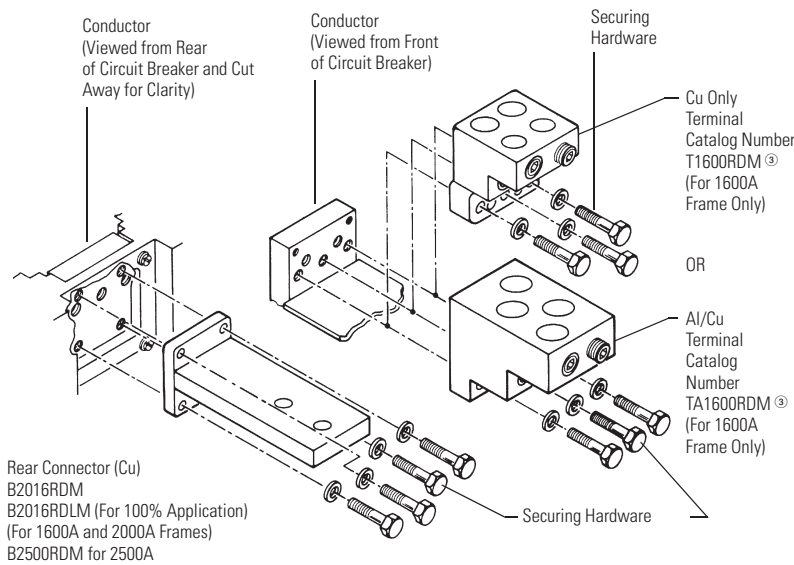
#### Line and Load Terminals

R-Frame circuit breakers use Cu/Al terminals as standard and copper only terminals as an option. Specify if factory installation is required. Must have terminals for 100% rated and or freeze testing requirements.

#### Line and Load Terminals

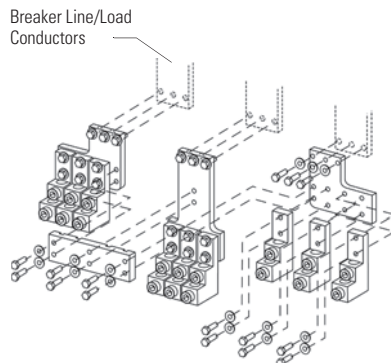
Maximum Breaker Amperes	Terminal Body Material	Wire Type	Hardware	AWG/kcmil Wire Range/ Number of Conductors	Metric Wire Range mm <sup>2</sup>	Catalog Number
<b>Wire Terminals</b>						
1600	Aluminum	Cu/Al	Metric	500–1000 (4)	300–500	<b>TA1600RDM</b> ①
1600	Copper	Cu	Metric	1–600 (4)	50–300	<b>T1600RDM</b> ①
2000	Aluminum	Cu/Al	Metric	2–600 (6)	35–300	<b>TA2000RDM</b> ②
<b>Rear Connectors</b>						
2000	Copper	—	Metric	—	—	<b>B2016RDM</b> ①
2000	Copper	—	Metric	—	—	<b>B2016RDLM</b> ①
2500	Copper	—	Metric	—	—	<b>B2500RDM</b> ①

#### RG Rear Connector Exploded View



#### TA2000RD Wire Terminal

**Note:** Order one TA2000RDM kit per three poles. Catalog number includes bus connection, terminals and hardware for either line side or load side of three-pole breaker.



#### Base Mounting Hardware

Supplied by customer.

#### Handle Extension

Included with breaker. Additional handle extensions are available.

#### Handle Extension

Description	Catalog Number
Single handle extension	<b>HEX6</b>

#### Notes

- ① Order one per pole—single terminals individually packed.
- ② Order one TA2000RD kit per three poles. Catalog number includes bus connection, terminals and hardware for either line side or load side of three-pole breaker.
- ③ For use with 2500A Frame. Do not order separately unless for replacement purposes. Included in breaker carton when 2500A frame is ordered.

RG MCCBs have metric threading on line and load conductors. Use RD MCCBs if imperial threading is required.

## Accessories

### Allowable Accessory Combinations

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

### RG-Frame Accessories

Description	Reference Page	Three-Pole			Four-Pole			Neutral
		Left	Center	Right	Left	Center	Right	
<b>Internal Accessories (Only One Internal Accessory Per Pole)</b>								
Alarm lockout (Make/Break)	V4-T2-104			■			■	
Auxiliary switch (1A, 1B)	V4-T2-104			■			■	
Auxiliary switch (2A, 2B)	V4-T2-104			■			■	
Auxiliary switch and alarm switch combination	V4-T2-104			■			■	
Shunt trip—standard	V4-T2-104			●			●	
Undervoltage release mechanism	V4-T2-105			●			●	
<b>External Accessories</b>								
Base mounting hardware	V4-T2-76	●	●	●	●	●	●	●
Padlockable handle lock hasp	V4-T2-102	□		□	□		□	
Key interlock kit	V4-T2-102	□		□	□		□	
Electrical operator	V4-T2-102	●	●	●	●	●	●	●
Handle mechanisms	V4-T2-407	●	●	●	●	●	●	●
Handle extension	V4-T2-76	●	●	●	●	●	●	●
Digitrip 310 test kit	V4-T2-102	●	●	●	●	●	●	●
<b>Modifications (Refer to Eaton)</b>								
Moisture fungus treatment	V4-T2-100	●	●	●	●	●	●	●
Freeze-tested circuit breakers	—	●	●	●	●	●	●	●
Marine/naval application, UL 489 Supplement SA and SB	①	●	●	●	●	●	●	●

#### Legend

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

#### Note

- ① Contact Eaton.

## Technical Data and Specifications

2

UL 489/CSA Interrupting Capacity Ratings <sup>①</sup>

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)			
		Volts AC (50/60 Hz)			
		240	277	480	600
RGH	3, 4	125	—	65	50
RGC	3, 4	200	—	100	65

IEC 947-2 Interrupting Capacity Ratings <sup>①</sup>

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)		
		Volts AC (50/60 Hz)		
		240	415	690
RGH	3, 4			
$I_{cu}$		135	70	25
$I_{cs}$		100	50	13
RGC	3, 4			
$I_{cu}$		200	100	35
$I_{cs}$		100	50	18

**Notes**

<sup>①</sup> Utilization Category A circuit breakers.

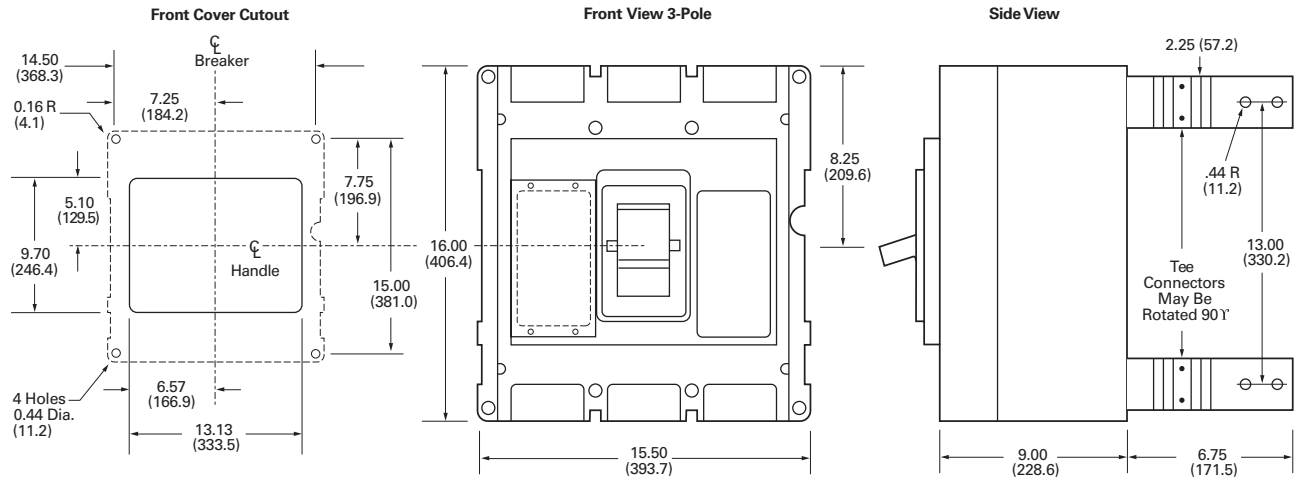
See **Page V4-T2-70** for trip unit specifications.

**Dimensions and Weights**

Approximate Dimensions in Inches (mm)

**RG-Frame**

Number of Poles	Width	Height	Depth
3	15.50 (393.7)	16.00 (406.4)	9.75 (247.7)
4	20.00 (508.0)	16.00 (406.4)	9.75 (247.7)



Approximate Shipping Weight in Lbs (kg)

RG-Frame

Breaker Type	Complete Breaker	
	Three-Pole	Four-Pole
<b>1600 Amperes</b>		
RGH, RGC	102 (46.3)	135 (61.2)
<b>2000 Amperes</b>		
RGH, RGC	102 (46.3)	135 (61.2)
<b>2500 Amperes</b>		
RGH, RGC	135 (61.2)	182 (82.6)

# 2.2

## Molded Case Circuit Breakers

Series G

2

Motor Circuit 480 Vac, Protectors



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LG-Frame (250–630 Amperes) . . . . .	<b>V4-T2-45</b>
NG-Frame (320–1200 Amperes) . . . . .	<b>V4-T2-61</b>
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### Motor Circuit Protectors (MCP)

## Product Selection Guide and Ordering Information

EG-Frame—480 Vac, 600Y/347 Vac Maximum <sup>①</sup>

Continuous Amperes	Cam Setting	Motor Full Load Current Amperes <sup>②</sup>	MCP Trip Setting <sup>③</sup>	MCP Catalog Number
3	A	0.69–0.91	9	HMCPE003A0C
	B	1.1–1.3	15	
	C	1.6–1.7	21	
	D	2.0–2.2	27	
	E	2.3–2.5	30	
	F	2.6–2.8	33	
7	A	1.5–2.0	21	HMCPE007C0C
	B	2.6–3.1	35	
	C	3.7–3.9	49	
	D	4.8–5.2	63	
	E	5.3–5.7	70	
	F	5.8–6.1	77	
15	A	3.4–4.5	45	HMCPE015E0C
	B	5.7–6.8	75	
	C	8.0–9.1	105	
	D	10.4–11.4	135	
	E	11.5–12.6	150	
	F	12.7–13.0	165	
30	A	3.9–9.1	90	HMCPE030H1C
	B	11.5–13.7	150	
	C	16.1–18.3	210	
	D	20.7–22.9	270	
	E	23.0–25.2	300	
	F	25.3–26.1	330	

**Notes**

<sup>①</sup> UL listed for use with Eaton Motor Starters.

<sup>②</sup> Motor FLA ranges are typical. The corresponding trip setting is at 13 times the minimum FLA value shown.

Where a 13 times setting is required for an intermediate FLA value, alternate cam settings and/or MCP ratings should be used.

<sup>③</sup> For DC applications, actual trip levels are approximately 40% higher than values shown.



EG-Frame—480 Vac, 600Y/347 Vac Maximum, continued <sup>①</sup>

Continuous Amperes	Cam Setting	Motor Full Load Current Amperes <sup>②</sup>	MCP Trip Setting <sup>③</sup>	MCP Catalog Number
50	A	11.5–15.2	150	HMCPE050K2C
	B	19.2–22.9	250	
	C	26.9–30.6	350	
	D	34.6–38.3	450	
	E	38.4–42.1	500	
	F	42.2–43.5	550	
70	A	16.1–30.6	210	HMCPE070M2C
	B	26.9–32.2	350	
	C	37.6–42.9	490	
	D	48.4–53.7	630	
	E	53.8–59.1	700	
	F	59.2–60.9	770	
100	A	23.0–30.6	300	HMCPE100R3C
	B	38.4–46.0	500	
	C	53.8–61.4	700	
	D	69.2–76.8	900	
	E	76.9–84.5	1000	
	F	84.6–87.0	1100	
100	A	38.4–46.0	500	HMCPE100T3C
	B	57.6–65.2	750	
	C	76.9–84.5	1000	
	D	④	1250	
	E	④	1375	
	F	④	1500	

JG-Frame—600 Vac Maximum, 250 Vdc Maximum <sup>①</sup>

Continuous Amperes	MCP Trip Range (Amperes)	MCP Catalog Number
250	500–1000	HMCPJ250D5L
	625–1250	HMCPJ250F5L
	750–1500	HMCPJ250G5L
	875–1750	HMCPJ250J5L
	1000–2000	HMCPJ250K5L
	1125–2250	HMCPJ250L5L
	1250–2500	HMCPJ250W5L

**Notes**

- <sup>①</sup> UL listed for use with Eaton Motor Starters.
- <sup>②</sup> Motor FLA ranges are typical. The corresponding trip setting is at 13 times the minimum FLA value shown. Where a 13 times setting is required for an intermediate FLA value, alternate cam settings and/or MCP ratings should be used.
- <sup>③</sup> For DC applications, actual trip levels are approximately 40% higher than values shown.
- <sup>④</sup> Settings above 10 x  $I_n$  are for special applications. Where the ampere rating of the disconnecting means cannot be less than 115% of the motor full load ampere rating.

**LG-Frame—600 Vac Maximum, 250 Vdc Maximum** <sup>①</sup>

Continuous Amperes	MCP Trip Range (Amperes)	MCP Catalog Number
600	1250–2500	<b>HMCPL600L6G</b>
	1500–3000	<b>HMCPL600N6G</b>
	1750–3500	<b>HMCPL600R6G</b>
	2000–4000	<b>HMCPL600X6G</b>
	2250–4500	<b>HMCPL600Y6G</b>
	2500–5000	<b>HMCPL600P6G</b>
	3000–6000	<b>HMCPL600M6G</b>

**Notes**

<sup>①</sup> UL listed for use with Eaton Motor Starters.

800 and 1200 ampere, 600 Vac maximum motor circuit protectors are available as Series C HMCP product.

**Series G Motor Protector Circuit Breakers (MPCB)**



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**Motor Protector Circuit Breakers (MPCB)**

**Product Description**

- Eliminates need for separate overload relay

**Application Description**

- Can be used with contactor to eliminate need for overload relay and still create manual motor control
- Meets requirement for motor branch protection, including:
  - Disconnecting means
  - Branch circuit short circuit protection
  - Overload protection

**Features and Benefits**

- Phase unbalance protection
- Phase loss protection
- Hot trip/cold trip
- High load alarm
- Pre-detection trip relay option
- Class 10, 15, 20, 30 protection

**Standards and Certifications**

- IEC 60947-2
- UL 489 100% rated
- UL 508
- CSA C22.2



**Product Selection****JGMP Catalog Numbers**

Continuous Amperes	35 kAIC Catalog Number	65 kAIC Catalog Number
50	JGMPS050G	JGMPH050G
100	JGMPS100G	JGMPH100G
160	JGMPS160G	JGMPH160G
250	JGMPS250G	JGMPH250G

**JGMP FLA Ie Dial Setting**

Continuous Amperes	A	B	C	D	E	F	G	H
50	20	20	25	30	32	40	45	50
100	40	45	50	63	70	80	90	100
160	63	80	90	100	110	125	150	160
250	100	125	150	160	175	200	225	250

**LGMP Catalog Numbers**

Continuous Amperes	50 kAIC Catalog Number	65 kAIC Catalog Number
250	LGMP250G	LGMPH250G
400	LGMP400G	LGMPH400G
600	LGMP600G	LGMPH600G
630 <sup>①</sup>	LGMP630G	LGMPH630G

**LGMP FLA Ie Dial Setting**

Continuous Amperes	A	B	C	D	E	F	G	H
250	100	125	150	160	175	200	225	250
400	160	200	225	250	300	315	350	400
600	250	300	315	350	400	450	500	600
630 <sup>①</sup>	250	300	315	350	400	500	600	630

**Notes**

<sup>①</sup> 630 amperes is not a UL listed rating. 600 amperes is the maximum UL or CSA for LG breaker.

For pre-trip alarm option, order Style Number 5721B31G02.

For additional breaker solutions, see **Page V4-T2-261**.

## Technical Data and Specifications

2

## JGMPS and JGMPH Rating and Ampere Range

Breaker Capacity (kA rms) AC 50–60 Hz			Maximum Rated Current—250A	
			Breaker Type	
			JGMPS	JGMPH
IEC 60947-2	220–240 Vac	I <sub>cu</sub>	85	100
		I <sub>cs</sub>	85	100
	380–415 Vac	I <sub>cu</sub>	40	70
		I <sub>cs</sub>	40	70
	660–690 Vac	I <sub>cu</sub>	12	14
		I <sub>cs</sub>	6	7
NEMA UL 489	240 Vac		85	100
	480 Vac		35	65
	600 Vac		25	35
Number of poles			3	3
Ampere range			50–250	50–250

## LGMP5 and LGMPH Rating and Ampere Range

Breaker Capacity (kA rms) AC 50–60 Hz			Maximum Rated Current—630A <sup>①</sup>	
			Breaker Type	
			LGMP5	LGMPH
IEC 60947-2	220–240 Vac	I <sub>cu</sub>	85	100
		I <sub>cs</sub>	85	100
	380–415 Vac	I <sub>cu</sub>	50	70
		I <sub>cs</sub>	50	53
	660–690 Vac	I <sub>cu</sub>	20	25
		I <sub>cs</sub>	10	13
NEMA UL 489	240 Vac		85	100
	480 Vac		50	65
	600 Vac		25	35
Number of poles			3	3
Ampere range			250–630 <sup>①</sup>	250–630 <sup>①</sup>

**Notes**

<sup>①</sup> 630 amperes is not a UL listed rating. 600 amperes is the maximum UL or CSA for LG breaker.

For pre-trip alarm option, order Style Number 5721B31G02.

30 mA Ground Fault (Earth Leakage) Modules



Clockwise from Left:  
JG, LG, EG MCCBs Shown with  
Ground Fault (Earth Leakage) Module

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Plug-In Blocks . . . . .	V4-T2-108
Drawout Cassette . . . . .	V4-T2-109

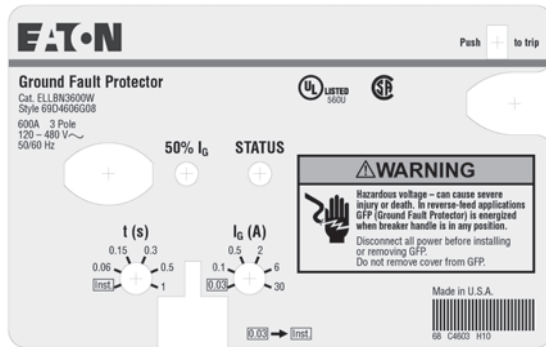
30 mA Ground Fault (Earth Leakage) Module

Product Description

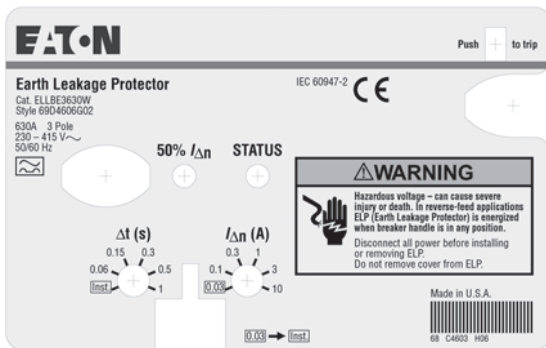
Eaton offers a three- and four-pole 30 mA ground fault (earth leakage) protection module for Series G E-, J- and L-Frame breakers. UL-listed modules are available for E, J and L molded case circuit breakers (MCCBs). The modules are bottom mounted for circuits up to 125A (E-Frame) 160 and 250 amperes (J-Frame), or 400 and 630 amperes for the L-Frame.

The module is completely self-contained because the current sensor, relay and power supply are located inside the product. Current pickup settings are selectable from 0.03–10 amperes for all IEC-rated modules and E and J UL-listed module, and 0.03–30 amperes for the L UL-listed modules. Time delays are also selectable from Instantaneous–1.0 seconds for 0.10 ampere settings and above. A current pickup setting of 0.03 amperes defaults to an Instantaneous time setting regardless of the time dial’s position. Two alarm contacts come as standard: a 50% pretrip and a 100% after trip, both based only on earth leakage current levels.

UL-Rated LG-Frame Earth Leakage Module Faceplate



IEC-Rated LG-Frame Earth Leakage Module Faceplate



#### Product Selection

2

##### EG-Frame



##### EG-Frame Ground Fault Modules, UL-Rated (Bottom Mounted, 120–480 Vac, 50/60 Hz) ①

Ampere Rating	Number of Poles	Catalog Number
125	3	ELEBN3125G
125	4	ELEBN4125G

##### EG-Frame Earth Leakage Modules, IEC-Rated (Bottom Mounted, 230–415 Vac, 50/60 Hz)

Ampere Rating	Number of Poles	Catalog Number
125	3	ELEBE3125G
125	4	ELEBE4125G

##### JG-Frame



##### JG-Frame Ground Fault Modules, UL-Rated (Bottom Mounted, 120–480 Vac, 50/60 Hz)

Ampere Rating	Number of Poles	Catalog Number
150	3	ELJBN3150W
150	4	ELJBN4150W
250	3	ELJBN3250W
250	4	ELJBN4250W

##### JG-Frame Earth Leakage Modules, IEC-Rated (Bottom Mounted, 230–415 Vac, 50/60 Hz)

Ampere Rating	Number of Poles	Catalog Number
160	3	ELJBE3160W
160	4	ELJBE4160W
250	3	ELJBE3250W
250	4	ELJBE4250W

##### Note

① Shunt trip and undervoltage release cannot be used in an EG breaker connected to an earth leakage module.

##### LG-Frame



##### LG-Frame Ground Fault Modules, UL-Rated (Bottom Mounted, 120–480 Vac, 50/60 Hz)

Ampere Rating	Number of Poles	Catalog Number
400	3	ELLBN3400W
400	4	ELLBN4400W
600	3	ELLBN3600W
600	4	ELLBN4600W

##### LG-Frame Earth Leakage Modules, IEC-Rated (Bottom Mounted, 230–415 Vac, 50/60 Hz)

Ampere Rating	Number of Poles	Catalog Number
400	3	ELLBE3400W
400	4	ELLBE4400W
630	3	ELLBE3630W
630	4	ELLBE4630W

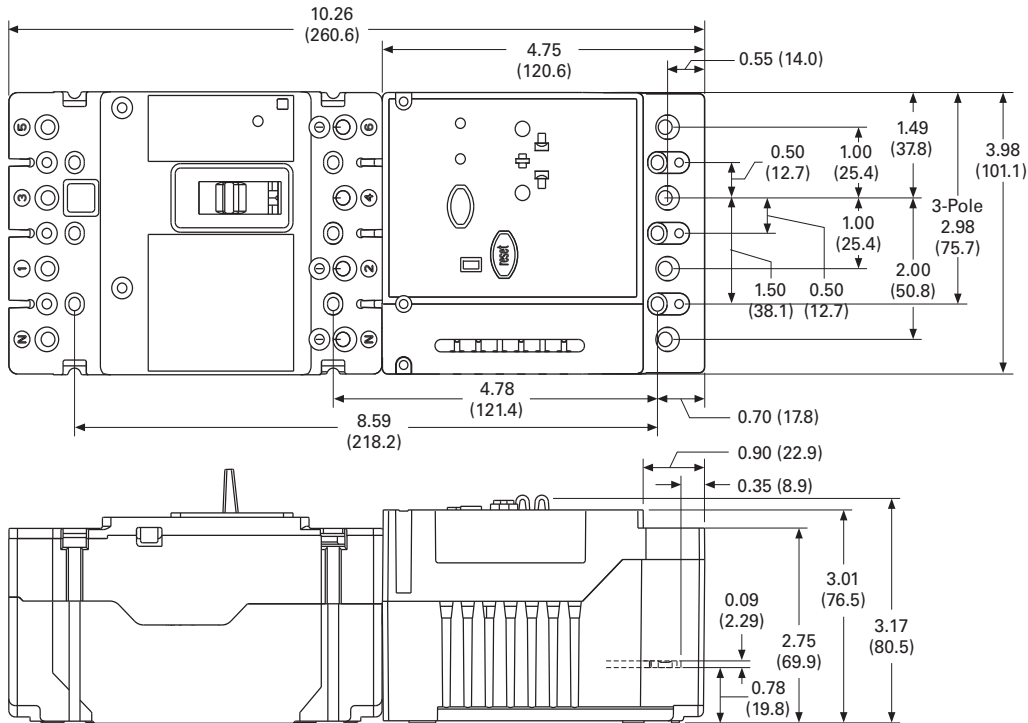
**Dimensions**

Approximate Dimensions in Inches (mm)

**Assembled Breaker and Earth Leakage Module**

Frame	Height	Width	Depth
<b>Three-Pole</b>			
EG	10.25 (260.3)	3.00 (76.2)	2.98 (75.8)
JG	11.25 (285.8)	4.13 (104.9)	3.57 (90.7)
LG	15.38 (390.7)	5.48 (139.2)	4.06 (103.1)
<b>Four-Pole</b>			
EG	10.25 (260.3)	4.00 (101.6)	2.98 (75.8)
JG	11.25 (285.8)	5.50 (139.7)	3.57 (90.7)
LG	15.38 (390.7)	7.23 (183.6)	4.06 (103.1)

**EG-Frame With Earth Leakage Module**





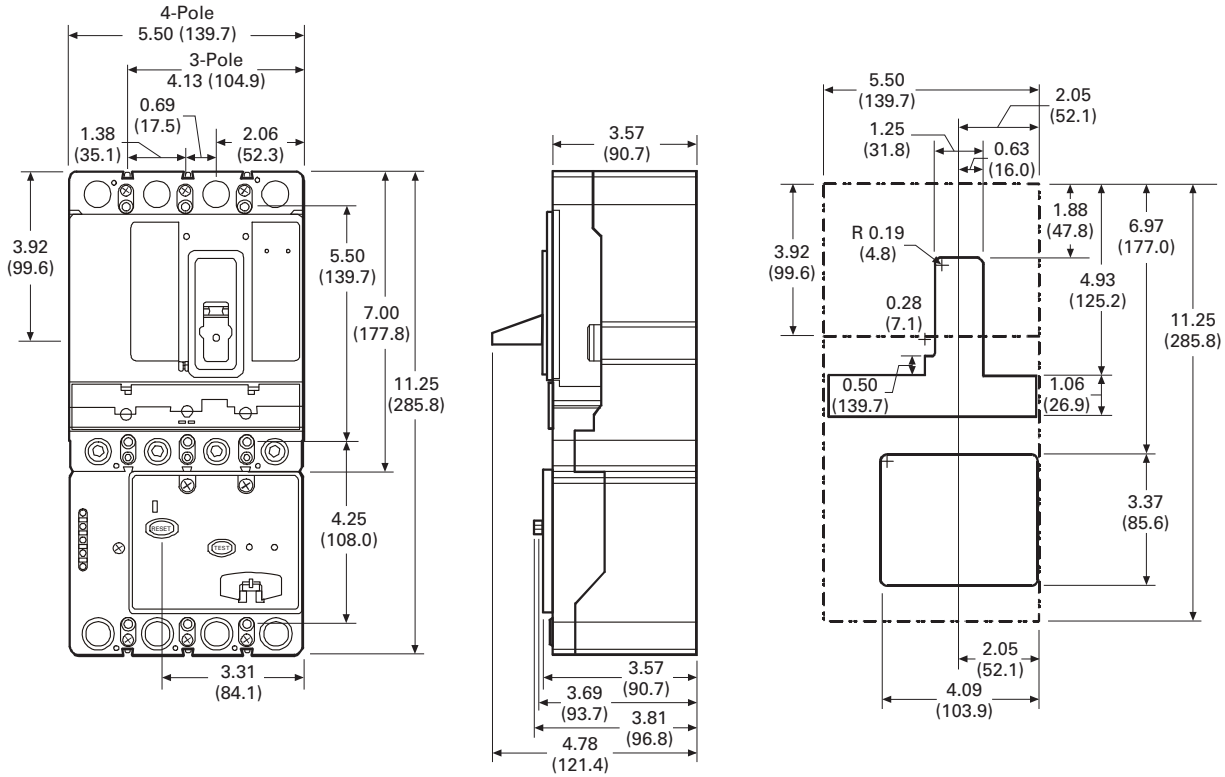
# 2.2

## Molded Case Circuit Breakers

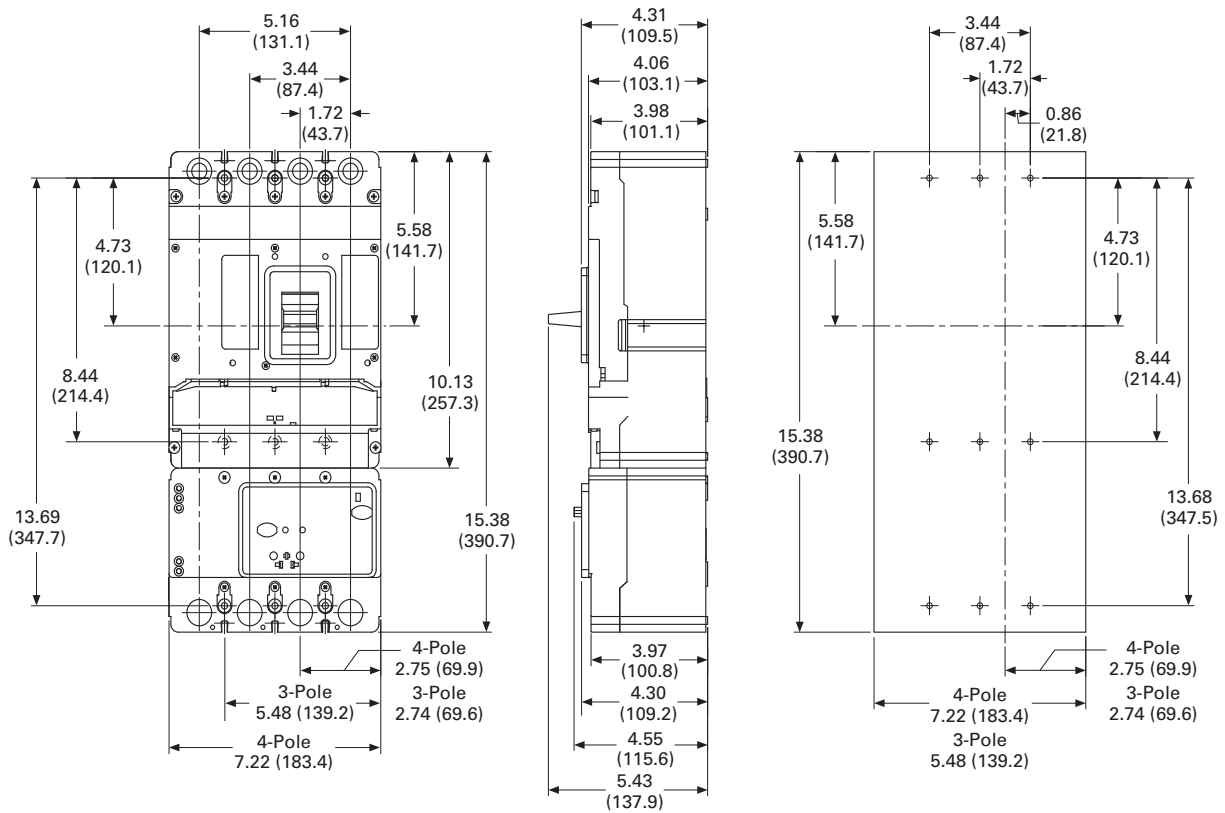
### Series G

2

#### JG-Frame With Earth Leakage Module



#### LG-Frame With Earth Leakage Module



**Current Limiting Circuit Breaker Modules**



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LG-Frame (250–630 Amperes) . . . . .	<b>V4-T2-45</b>
NG-Frame (320–1200 Amperes) . . . . .	<b>V4-T2-61</b>
RG-Frame (800–2500 Amperes) . . . . .	<b>V4-T2-70</b>
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**Current Limiting Circuit Breaker Module**

**Product Overview**

Power demand continues to grow in new and existing facilities. To meet increased demand, larger utility supplies, spot networks and large facility transformers are installed. The increased capacity of the electrical source results in increased fault currents in excess of 100 kA short-circuit protection. Eaton manufactures non-fused current limiting modules with interrupting capacities up to 200 kA at 600 Vac or 70 kA at 690 Vac. Unlike fused current limiters with a one-time use, a current limiter module provides an automatic reset of the module after a short-circuit event. Resetting the molded-case circuit breaker is the only action required to restore critical power to the system; there is no time wasted with sourcing the correct replacement fuses or module to bring system back online.

**Product Description**

The current limiting breaker modules use a unique contact design to enhance the system protection similar to that of the circuit breaker. When high short-circuit current is flowing through the contacts of these modules, the design results in very high interrupting capacities and improved current limiting characteristics.

**Application Description**

High-performance breakers are most commonly applied when very high fault levels are available and with applications where the current limiting capability is used upstream of the final load to limit current. Typical loads include lighting, power distribution, and motor control applications.

**Features and Benefits**

Superior system protection:

- Auto reset improves system uptime and eliminates the need for finding replacement parts
- No fuses to replace, reducing the overall cost of ownership and the waste created by fuses
- Overloads, by using inverse time current tripping characteristics of the molded-case circuit breaker
- Low-level short circuits, by using instantaneous and/or short-time delay tripping characteristics of the molded-case circuit breaker
- High-level short circuits, by using ultra-high-speed, blow-apart contacts of the current limiting module in series with the circuit breaker contacts
- Let-through currents, by improved opening speed of the contacts, the resultant rapid rise of arc voltage introduces impedance into the system

**Standards and Certifications**

- IEC 60947-2
- UL 489
- CSA C22.2



## Product Selection

2

## Series G High Performance Family Offering

Type	Product	Amperes	480 Vac (UL)	600 Vac (UL)	415 Vac (IEC)		690 Vac (IEC)	
					I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>
EGC 3P thermal-magnetic	Breaker only	15–125	100	35 <sup>①</sup>	100	100	—	—
	With limiter	15–100	150	100 <sup>①</sup>	150	150	—	—
JG 3P thermal-magnetic	Breaker only	70–250	200	50	200	200	18	14
	With limiter	70–225	200	200	200	150	70	18
JG 3P electronic	Breaker only	20–250	200	50	200	200	18	14
	With limiter	100–250	200	200	200	150	70	18
LG 3P thermal-magnetic	Breaker only	250–600	200	65	200	200	35	18
LG3P electronic	Breaker only	100–600	200	65	200	200	35	18

## EG-Frame



## EG IC Rating—150 kAIC at 415 and 480 Vac

UL Listed (NEMA/IEC Rated) Base Molded Case Circuit Breaker	Breaker with Line Side Mounted Current Limiter	Breaker with Load Side Mounted Current Limiter	Line and Load Terminations Included <sup>②</sup>	Interphase Barrier Included for Limiter
EGC3015FFG	EGC3015FFGQ01	EGC3015FFGQ02	T125EF	EIPBSK
EGC3016FFG	EGC3016FFGQ01	EGC3016FFGQ02	T125EF	EIPBSK
EGC3020FFG	EGC3020FFGQ01	EGC3020FFGQ02	T125EF	EIPBSK
EGC3025FFG	EGC3025FFGQ01	EGC3025FFGQ02	T125EF	EIPBSK
EGC3030FFG	EGC3030FFGQ01	EGC3030FFGQ02	T125EF	EIPBSK
EGC3032FFG	EGC3032FFGQ01	EGC3032FFGQ02	T125EF	EIPBSK
EGC3035FFG	EGC3035FFGQ01	EGC3035FFGQ02	T125EF	EIPBSK
EGC3040FFG	EGC3040FFGQ01	EGC3040FFGQ02	T125EF	EIPBSK
EGC3045FFG	EGC3045FFGQ01	EGC3045FFGQ02	T125EF	EIPBSK
EGC3050FFG	EGC3050FFGQ01	EGC3050FFGQ02	T125EF	EIPBSK
EGC3060FFG	EGC3060FFGQ01	EGC3060FFGQ02	T125EF	EIPBSK
EGC3063FFG	EGC3063FFGQ01	EGC3063FFGQ02	T125EF	EIPBSK
EGC3070FFG	EGC3070FFGQ01	EGC3070FFGQ02	T125EF	EIPBSK
EGC3080FFG	EGC3080FFGQ01	EGC3080FFGQ02	T125EF	EIPBSK
EGC3090FFG	EGC3090FFGQ01	EGC3090FFGQ02	T125EF	EIPBSK
EGC3100FFG	EGC3100FFGQ01	EGC3100FFGQ02	T125EF	EIPBSK

## Notes

<sup>①</sup> 600Y/347V.

<sup>②</sup> Two interphase barriers included on line end mounted limiter; (2) line end of limiter. Four interphase barriers included on load end mounted limiter; (2) line end of breaker (2) load end of limiter.

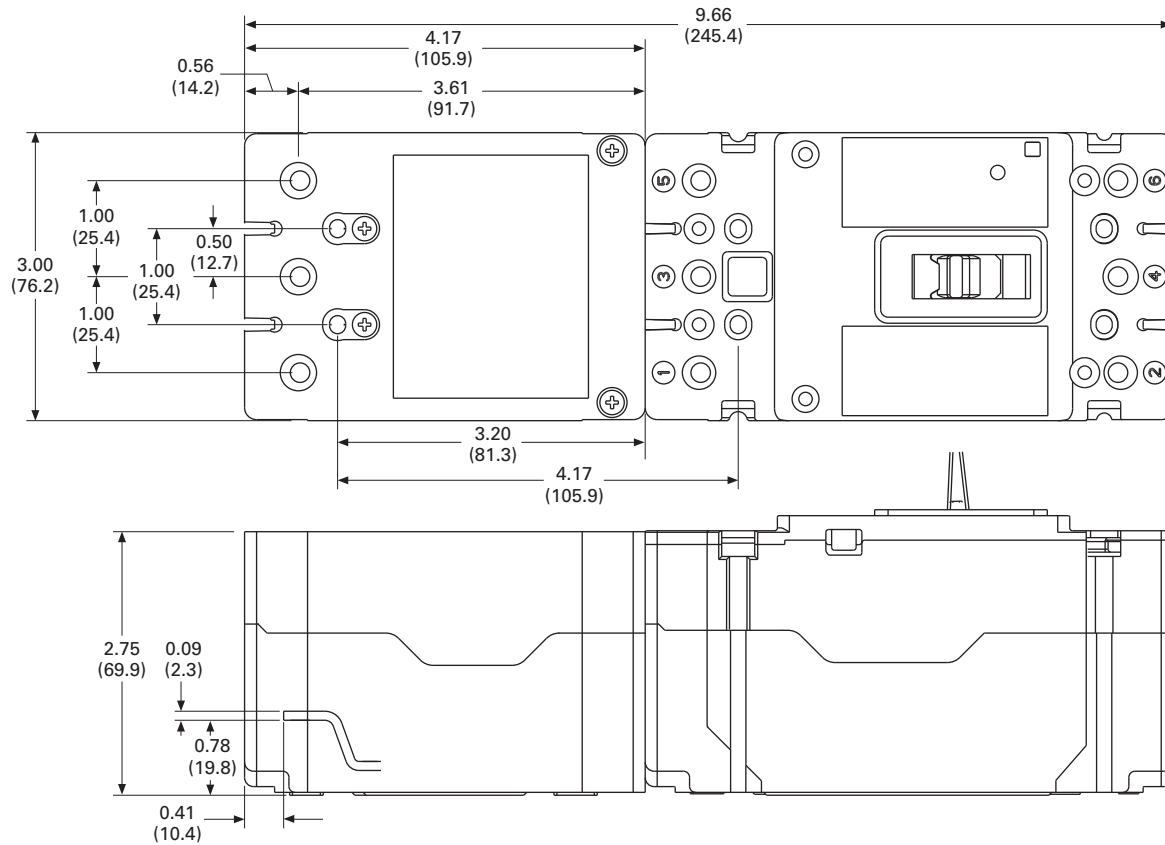
## Dimensions and Weights

Approximate Dimensions in Inches (mm)

### Assembled Breaker and Current Limiting Module

Frame	Height	Width	Depth	Weight in lbs (kg)
EG	9.66 (245.7)	3.00 (76.2)	2.98 (75.8)	2.91 (1.32)
HMCP	9.66 (245.7)	3.00 (76.2)	2.98 (75.8)	4.18 (1.90)

### EG-Frame With Current Limiter Module



JG Frame



#### JG IC Rating—200 kAIC at 600 Vac and 70 kAIC at 690 Vac

Ampere Rating	Magnetic Range	UL Listed, IEC Rated Breaker With Line Side Mounted Current Limiter <sup>①</sup>	UL Listed, IEC Rated Breaker With Load Side Mounted Current Limiter <sup>②</sup>	IEC Rated Breaker With Line Side Mounted Current Limiter <sup>①</sup>	IEC Rated Breaker With Load Side Mounted Current Limiter <sup>②</sup>
		<b>Fixed Thermal, Adjustable Magnetic</b>		<b>Adjustable Thermal, Adjustable Magnetic</b>	
70	350–700	JGH3070FAGQ01	JGH3070FAGQ02	—	—
90	450–900	JGH3090FAGQ01	JGH3090FAGQ02	—	—
100	500–1000	JGH3100FAGQ01	JGH3100FAGQ02	JGH3100AAGQ01	JGH3100AAGQ02
125	625–1250	JGH3125FAGQ01	JGH3125FAGQ02	JGH3125AAGQ01	JGH3125AAGQ02
150	750–1550	JGH3150FAGQ01	JGH3150FAGQ02	—	—
160	800–1600	—	—	JGH3160AAGQ01	JGH3160AAGQ02
175	875–1750	JGH3175FAGQ01	JGH3175FAGQ02	—	—
200	1000–2000	JGH3200FAGQ01	JGH3200FAGQ02	JGH3200AAGQ01	JGH3200AAGQ02
225	1125–2250	JGH3225FAGQ01	JGH3225FAGQ02	—	—
		<b>Electronic Trip LS</b>			
250	—	JGH325033GQ01	JGH325033GQ02	—	—
		<b>Electronic Trip LSI</b>			
250	—	JGH325032GQ01	JGH325032GQ02	—	—
		<b>Electronic Trip LSG</b>			
250	—	JGH325035GQ01	JGH325035GQ02	—	—
		<b>Electronic Trip LSIG</b>			
250	—	JGH325036GQ01	JGH325036GQ02	—	—

#### Series G HMCP

Ampere Rating	Motor Circuit Protector with Line Side Mounted Current Limiter	Breaker with Load Side Mounted Current Limiter
250	HMCPJ250D5LQ01	HMCPJ250D5LQ02
250	HMCPJ250F5LQ01	HMCPJ250F5LQ02
250	HMCPJ250G5LQ01	HMCPJ250G5LQ02
250	HMCPJ250J5LQ01	HMCPJ250J5LQ02
250	HMCPJ250K5LQ01	HMCPJ250K5LQ02
250	HMCPJ250L5LQ01	HMCPJ250L5LQ02

#### Line and Load Terminals

Maximum Breaker Amperes	Terminal Body Material	Wire Type	Metric Wire Range mm <sup>2</sup>	AWG Wire Range/ Number of Conductors	Catalog Number
<b>Standard Pressure Type Terminals</b>					
250	Aluminum	Cu/Al	10–185	#8–350 (1)	TA250FJ <sup>③</sup>

#### Notes

- ① Two interphase barriers provided, mounted on line end of limiter, catalog number FJIPBK.
- ② Four interphase barriers provided, (2) line end of breaker, (2) load end of limiter.
- ③ Line and load terminals included with products listed above.

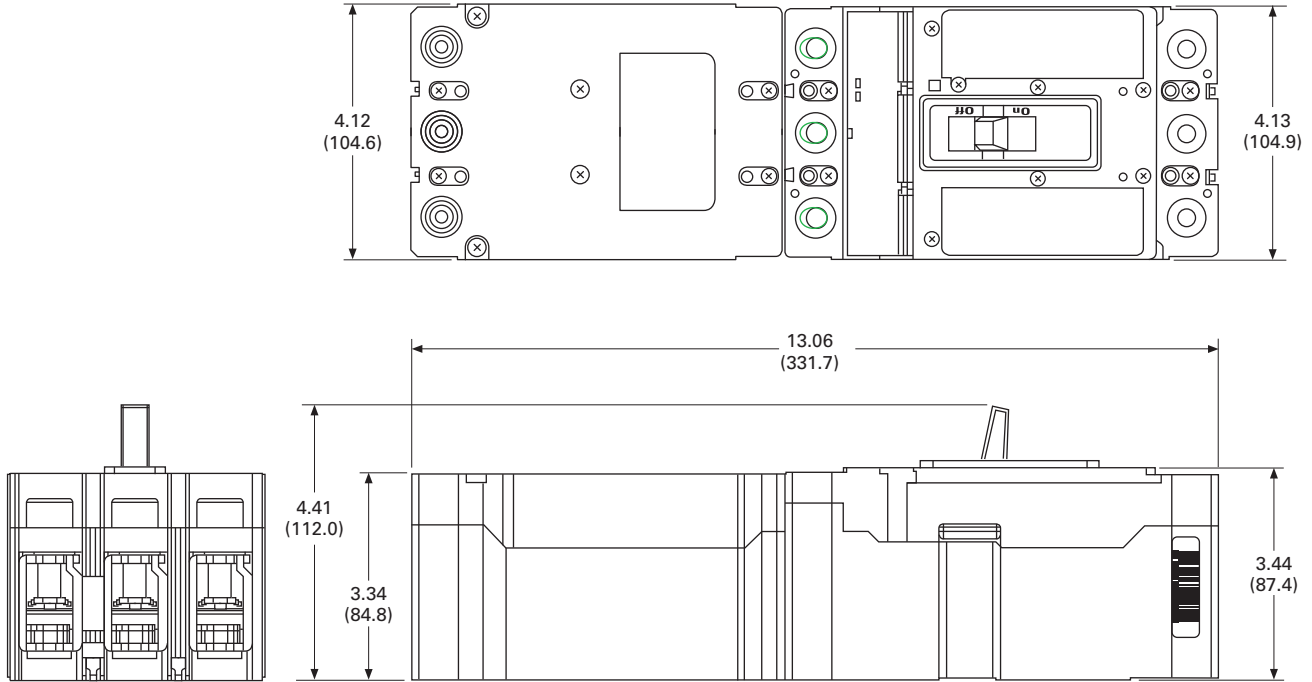
**Dimensions and Weights**

Approximate Dimensions in Inches (mm)

**Assembled Breaker and Current Limiting Module**

Frame	Height	Width	Depth	Weight in lbs (kg)
JG + limiter	13.06 (331.7)	4.13 (104.9)	3.44 (87.4)	9.87 (4.48)
HMCP	13.06 (331.7)	4.13 (104.9)	3.44 (87.4)	9.87 (4.48)

**JG-Frame With Current Limiter Module**



#### High Instantaneous Circuit Breaker for Selective Coordination



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Drawout Cassette . . . . .	<b>V4-T2-109</b>

### High Instantaneous Circuit Breaker for Selective Coordination

#### Product Description

Eaton’s Electrical Sector introduces new high-magnetic withstand molded case circuit breakers, specifically designed for critical operations and selective coordination requirements. The high-magnetic withstand LHH and NHH frames continue the legacy of circuit breaker innovation for which Eaton is recognized throughout the world. The LHH and NHH breakers are equipped with 125 to 400 ampere trip units with high-magnetic capability. This design enables the breakers to withstand up to 90 times rated current before opening under short-circuit conditions.

The LHH and NHH circuit breakers incorporate a higher level of instantaneous pickup, thus allowing for higher current levels of selective coordination. Standard molded case circuit breakers typically are furnished with a magnetic pickup or electronic instantaneous adjustment or instantaneous override set at 10 times (10x) the continuous trip rating.

#### Features, Benefits and Functions

Eaton’s new LHH and NHH molded case circuit breakers are furnished with a higher level of magnetic pickup or electronic instantaneous settings as indicated in table on **Page V4-T2-98**. These higher levels of magnetic pickup and electronic instantaneous values in turn allow the system designer to obtain selective coordination at fault current levels up to these higher ratings. Greater values of selective coordination are available based on manufacturer tested combinations using the LHH and NHH as line-side breakers and standard breakers as load-side devices. Refer to IA01200002E to determine the maximum fault values that selective coordination achieves. When the line-side and load-side molded case circuit breaker trip ratings are chosen to coordinate in the overload range, they also can be selectively coordinated in the fault range up to the values listed in the table on **Page V4-T2-98** or IA01200002E. For overcurrents protected by circuit breakers on the load-side of the LHH or NHH, only the effected load-side circuit breaker will open, while the line-side LHH and/

or NHH circuit breakers remain closed, thus providing continuity of power to the other critical loads supplied by the LHH or NHH circuit breakers.

#### **Benefits of Using the LHH and NHH Molded Case Circuit Breakers**

Customer expectations and codes are driving product development to protect customers’ critical operations. NEC® 2005 and 2008 requires circuits with elevators, emergency systems, legally required standby systems, health care essential systems and critical operation power systems to be selectively coordinated. Simply stated, only the closest protective device directly protecting the circuit having an overcurrent (overload or fault) condition should open.

All other overcurrent protective devices within these systems shall remain closed. Similarly, backup power system designs of a critical nature that are not code mandated may also require overcurrent protective devices to be selectively coordinated as much as practicable to provide a higher level of uptime.

**Product Selection**

**Proven Technology and Performance**

The LHH is based on the Series G L-Frame circuit breaker, sharing the same small footprint and field-fit accessories as the L-Frame breaker. The NHH is based on the Series G N-Frame circuit breaker and shares the same footprint and accessories as the N-Frame breaker. NHH accessories must be factory installed.

The LHH incorporates a thermal-magnetic trip unit with fixed thermal and fixed magnetic settings. The NHH has an OPTIM™ electronic trip unit with LSI adjustment capabilities. The instantaneous setting is adjustable from 1000–4000A or may be turned off to default to the frame override of 14,000A. A hand-held OPTIMizer must be used with the NHH to adjust short-time delay and instantaneous, however, the long delay pickup is fixed and cannot be adjusted.

The LHH and NHH breakers are available in Eaton’s panelboards and switchboards.

**Standards and Certifications**

- UL
- CSA



LHH



**LHH and NHH Catalog Numbers**

Ampere Rating	Thermal-Magnetic Trip Unit	LSI Electronic Trip Unit
	LHH Frame	NHH Frame
125	LHH3125FFG	—
150	LHH3150FFG	NHH3150T52X15
175	LHH3175FFG	NHH3175T52X15
200	LHH3200FFG	NHH3200T52X15
225	LHH3225FFG	NHH3225T52X15
250	LHH3250FFG	NHH3250T52X15
300	LHH3300FFG	NHH3300T52X15
350	LHH3350FFG	NHH3350T52X15
400	LHH3400FFG	—



# 2.2

## Molded Case Circuit Breakers

### Series G

2

#### Technical Data and Specifications

- Three-pole
- 65 kAIC at 480 Vac
- 125–400 ampere LHH
- 150–350 ampere NHH
- Trip units:
- LHH—thermal-magnetic
- NHH—LSI electronic trip unit
- No rating plugs required
- Factory-sealed breakers
- LHH uses same internal and external accessories as standard Series G L-Frame circuit breaker
- NHH uses same internal and external accessories as standard Series G N-Frame circuit breaker

#### LHH and NHH Electrical Characteristics

#### Short-Circuit Current Ratings (kA rms) AC 50–60 Hz

Description	Breaker Type	
	LHH	NHH
Max. rated current (amperes)	400	350
NEMA UL 489		
240 Vac	100	100
480 Vac	65	65
600 Vac	35	35
250 Vac	42	—
IEC 60947-2		
220 Vac	100	100
415 Vac	70	70
690 Vac	25	25
125/250 Vdc	22	—
Number of poles	3	3
Ampere range	125–400A	150–350A

#### Continuous Current Ratings

Continuous Current Rating (I <sub>c</sub> )	Magnetic Trip Point	Continuous Current Multiplier	Instantaneous Trip Point	Continuous Current Multiplier	Short Delay Pickup
125A	2500A	20x	—	—	—
150A	2500A	16x	14,000A	93x	225–1200A
175A	4000A	22x	14,000A	80x	260–1400A
200A	4000A	20x	14,000A	70x	300–1600A
225A	6000A	26x	14,000A	62x	338–1800A
250A	6000A	24x	14,000A	56x	375–2000A
300A	6000A	20x	14,000A	47x	450–2400A
350A	6000A	17x	14,000A	40x	525–2800A
400A	6000A	15x	—	—	—

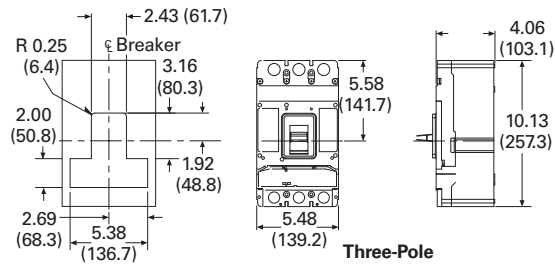
#### Dimensions

Approximate Dimensions in Inches (mm)

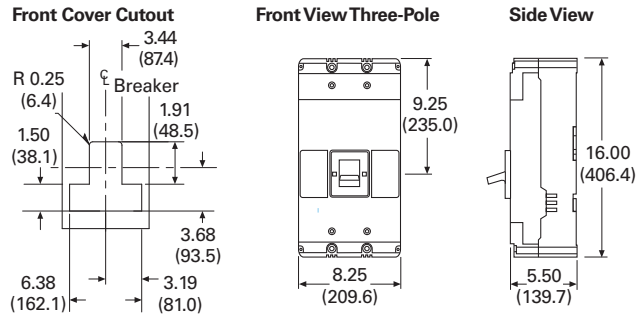
#### Dimensions

Description	Height	Width	Depth	Weight in Lbs (kg)
LHH	10.13 (257.3)	5.48 (139.2)	4.09 (103.9)	12.36 (5.6)
NHH	16.00 (406.4)	8.25 (209.5)	5.50 (139.7)	46.80 (21.2)

#### L-Frame



#### N-Frame



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Drawout Cassette . . . . .	<b>V4-T2-109</b>

**Special Features and Accessories**

Eaton’s molded case circuit breakers are designed to provide circuit protection for low voltage distribution systems. They are described by NEMA as, “... a device for closing and interrupting a circuit between separable contacts under both normal and abnormal conditions,” and furthermore as, “... a breaker assembled as an integral unit in a supporting and enclosing housing of insulating material.” The National Electrical Code (NEC) describes them as, “A device designed to open and close a circuit by non-automatic means, and to open the circuit automatically on a predetermined overload of current, without injury to itself when properly applied within its rating.”

So designed, Eaton circuit breakers protect conductors against overloads and conductors and connected apparatus, such as motors and motor starters, against short circuits.

In low voltage distribution systems, there are many varied applications of molded case circuit breakers. Eaton offers the most comprehensive family of molded case circuit breakers in the industry.

This section of circuit breakers includes:

- Thermal-magnetic trip breakers
- Electronic rms trip breakers
- Molded case switches
- Motor circuit protectors
- Current limiting breakers
- Special application breakers

**Modified Breakers**

Eaton breakers can be ordered with internal accessories installed. These modified breakers will be subject to an addition charge.

**Special Calibration**

Special non-UL listed calibrations are available for certain ambient temperatures other than 40°C and for frequencies other than 50/60 Hz or DC. Reduced interrupting ratings will apply for 400 Hz applications.

- Add suffix H01 to breaker catalog number for 400 Hz rating

**50°C Calibration**

**Note:** Breakers equipped with electronic trip units can operate reliably in ambient temperatures of 50°C. Add suffix “V3” to NG MCCBs to remove standard 40°C labeling.

Add suffix “V” to catalog number for complete thermal magnetic breaker when ordering listed ampere ratings for breakers to be used in 50°C ambients. 50°C ambient MCCBs are not UL listed.

Contact Eaton for availability.

**Calibrations and Treatment**

Description	Frame				
	EG	JG	LG	NG	RG
Special calibration	■	■	■	■	■
Moisture-fungus treatment	■	■	■	■	■

**Moisture-Fungus Treatment**

All Eaton circuit breaker cases are molded from glass-polyester, which does not support the growth of fungus. Any parts that are susceptible to the growth of fungus will require special treatment.

Order by description.

- Add suffix J01 to breaker catalog number

**Freeze-Tested Circuit Breakers**

The circuit breakers may be ordered with freeze testing. This option uses special lubrication and mechanical operation is verified at  $-40^{\circ}\text{C}$ .

- Add suffix F01 to catalog number  $-57^{\circ}\text{F}$ , F02  $-30^{\circ}\text{F}$

**Marine Applications**

E- to R-Framed circuit breakers can be supplied to meet the following marine specifications:

- U.S. Coast Guard CFR 46; ABS—American Bureau of Shipping; IEEE 45; DNV; and Lloyds

These specifications generally require molded case circuit breakers to be supplied with  $50^{\circ}\text{C}$  ambient, and plug-in adapter kits. When plug-in adapter kits are used, no terminals need be supplied (switchboard applications).

Circuit breakers can also be supplied to meet UL 489 Supplement SA (Marine use) and UL 489 Supplement SB (Naval Use).

UL 489 Supplement SA applies to vessels over 65 feet (19.8m) in length.

Requirements include  $40^{\circ}\text{C}$  ambient calibration, special labeling, and no use of aluminum conductors or terminals. (No  $50^{\circ}\text{C}$ .)

- Add suffix H08

Or you can choose to add  $50^{\circ}\text{C}$  ambient but then there is no "UL" mark.

- Add suffix VH08

UL 489 Supplement SB requires partial  $50^{\circ}\text{C}$  ambient calibration, vibration testing, special nameplating and no use of aluminum conductors or terminals. Eaton chooses to always fully calibrate to  $50^{\circ}\text{C}$  ambient. ("Naval" labeled per UL but no "UL" mark due to  $50^{\circ}\text{C}$  label.)

- Add suffix VH09

**Certified Test Reports**

Eaton breakers can be ordered with certified test reports at the time of order entry. Test report documents the thermal and magnetic or electronic tripping characteristics of the individual breaker. Breaker and test report must be ordered together. Add suffix 12 to breaker catalog number and enter separate line item on order for certified test report.

**Standards and Certifications**

Molded case circuit breakers are designed to conform with the following standards:

- Underwriters Laboratories Inc., Standard UL 489, molded case circuit breakers and circuit breaker enclosures
- National Electrical Manufacturers Association (NEMA) Standards Publication No. AB1-1993, molded case circuit breakers
- Australian Standard AS 2184, molded case circuit breakers
- British Standards Institution Standard BS 4752: Part 1, switchgear and control gear Part 1: circuit breakers
- Canadian Standards Association (CSA) Standard C22.2 No. 5, service entrance and branch circuit breakers
- International Electrotechnical Commission Recommendations IEC 60947-2, circuit breakers
- Japanese T-Mark Standard molded case circuit breakers
- South African Bureau of Standards, Standard SABS 156, Standard Specification for molded case circuit breakers
- Swiss Electro-Technical Association Standard SEV 157-1, safety regulations for circuit breakers
- Union Technique de l'Electricite Standard NF C 63-120, low voltage switchgear and control gear circuit breaker requirements
- Verband Deutscher Elektrotechniker (Association of German Electrical Engineers) Standard VDE 0660, low voltage switchgear and control gear, circuit breakers

Conformance with these standards satisfies most local and international codes, assuming user acceptability and simplified application.

Molded case circuit breakers equal or exceed Federal Specification Classification W-C-375b requirements for the particular class associated with the circuit breaker frame being considered.

Open breakers do not have service entrance ratings. Service entrance rating is part of the enclosure.



**Internal Accessories**

**Alarm Lockout**

The alarm switches operate when the circuit breaker is tripped by a short circuit or overcurrent, but also when it is tripped by a shunt trip or undervoltage release.

**Auxiliary Switches**

Auxiliary switches are used for signaling and control purposes. The various functions of the auxiliary switches (changeover) are shown on **Page V4-T2-103**.

**Shunt Trips**

The shunt trip is used for remote tripping.

The coil of the shunt trip is rated only for short-time operation.

It is not permissible with the circuit breaker open to apply a continuous opening command to the shunt trip in order to prevent the breaker from closing. This means that interlocking circuits with continuous commands may not be set up with shunt trips.

**Undervoltage Releases**

The circuit breaker cannot be closed until the undervoltage release is energized. If the release is not energized, the circuit breaker can only perform an idle switching operation.

Frequent idle switching actions should be avoided as they shorten the endurance of the circuit breaker.

**Cause of Trip Display/Remote Mount Cause of Trip Display**

The Cause of Trip Display can be field-installed on any Digitrip RMS 310+ trip unit. The device provides breaker information through an LCD screen, such as cause of trip, phase current, ground current and low loads. The display is ideal for troubleshooting common trips such as ground fault, long delay, and instantaneous/short delay. The DIGIVIEW version will provide a local display at the breaker without additional wiring by connecting directly onto the trip unit. The DIGIVIEWR06 version has a 6 foot cable that allows users to mount the display on the outside of an enclosure door and connect to the trip unit that is contained inside the enclosure.

**Cause of Trip Display/Remote Mount Cause of Trip Display**

**Catalog Number**

DIGIVIEW

DIGIVIEWR06

**Cause of Trip LED Module**

The Cause of Trip LED Module can be field-installed on any Digitrip RMS 310+ trip unit. The device provides a cause of trip indication via LED. The Cause of Trip LED Module connects directly onto the trip unit. When the breaker trips, the module indicates the cause of trip (long delay, short delay, instantaneous and ground) via LED indication. The module is reset after the breaker is reset.

**Cause of Trip LED Module**

**Catalog Number**

TRIP-LED

## External Accessories and Test Kit

2

## External Accessories

Description	Fit Type	Frame				
		EG	JG	LG	NG	RG
Non-padlockable handle block	Field	EFHB	—	—	LKD4	—
Padlockable handle block	Field	EFPHB	—	—	—	—
Padlockable handle block off-only	Field	EFPHBOFF	FJPHBOFF	LBHPOFF	—	—
Padlockable handle lock hasp	Field	EFPLK	FJPHL	LPHL	PLK5	HLK6
Padlockable handle lock hasp off-only	Field	EFPHLOFF	FJPHLOFF	LPHLOFF	PLK55OFF	HLK60FF
Kirk key interlock kit ①②	Field	—	KYKJG	KYKLG	KYK4	KYK6
Castell key interlock kit ②③	Field	—	CTKJG	CTKLG	CTK4	CTK6
Slide bar interlock ④	Field	EFSBI	FJSBI	LGSBI	SBK5	—
Walking beam interlock ④	Three-pole	EG3WBI	JG3WBI	LG3WBI	WBL5	WBL6
	Four-pole	EG4WBI	JG4WBI	LG4WBI	WBL5	—
Electrical operator ⑤	120 Vac	MOPEG240C	MOPJG120C	MOPLG120C	EOP5T07	EOP6T08K
	240 Vac	MOPEG240C	MOPJG240C	MOPLG240C	EOP5T11	EOP6T11K
	24 Vdc	MOPEG48D	MOPJG24D	MOPLG24D	EOP5T21	—
	48 Vdc	MOPEG48D	—	—	EOP5T22	EOP6T21K
	125 Vdc	MOPEG120C	MOPJG120C	MOPLG120C	EOP5T26	—
	220 Vdc	—	MOPJG240C	MOPLG240C	—	—
	250 Vdc	—	MOPJG240C	MOPLG240C	—	—
Plug-in adapters	Three-pole	PAD3E	PAD3J	PAD3L	PAD53	—
	Four-pole	PAD4E	PAD4J	PAD4L	—	—
Rear connecting studs ⑥	Field	EFRCSDL	FJRCSDL	LRCS3WK (3P)	—	—
		EFRCSDS	FJRCSDS	LRCS4WK (4P)	—	—
		EFRCSWL	FJRCSWL	—	—	—
		EFRCSWS	FJRCSWS	—	—	—

## Test Kit

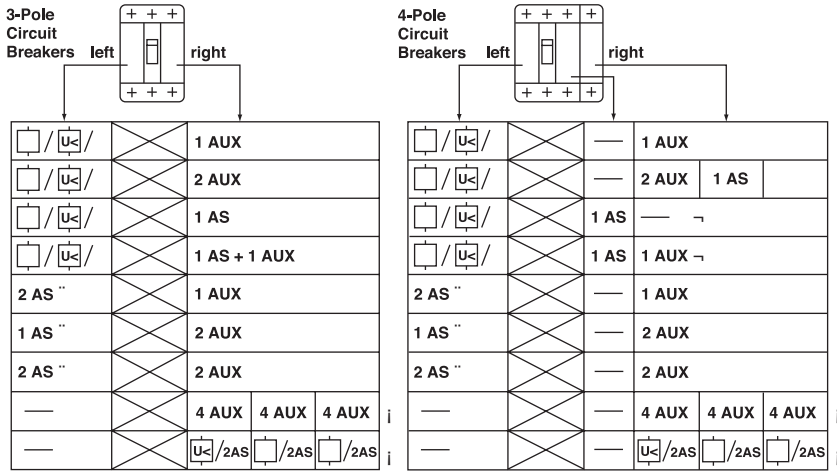
Description	Fit Type	Frame				
		EG	JG	LG	NG	RG
Electronic portable test kit	120V	N/A	MTST120V	MTST120V	MTST230V ⑦	MTST230V ⑦
	230V	N/A	MTST230V	MTST230V	MTST230V ⑦	MTST230V ⑦

## Notes

- ① Provision only.
- ② See **Page V4-T2-311** for bolt projection dimensions.
- ③ Castell bolt mounting hole must be 10 mm.
- ④ Requires two breakers.
- ⑤ Contact Eaton for availability of operators for EG- and NG-Frames before December 2004.
- ⑥ D = Imperial threads UL, W = metric threads IEC, L = long studs, S = short studs.
- ⑦ MTST230V applies to 100–230 Vac, resulting in the same catalog number for 120V and 230V.

Accessory Configurations for EG–RG Circuit Breakers

Internal Accessory Configurations



□ / U<sub><</sub> / = Shunt Trip or Undervoltage Release

AUX = Auxiliary Switch

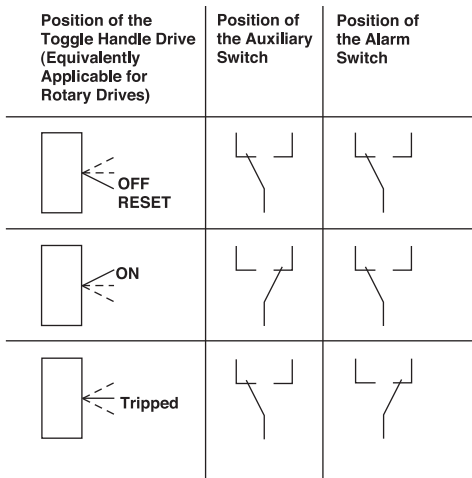
AS = Alarm Switch

" = For N-Frame Circuit Breakers Only

≠ = For R-Frame Circuit Breakers Only

↔ = For N and R-Frame Circuit Breakers Only

Contact Making by the Auxiliary and Alarm Switches as a Function of the Switching Position of the Circuit Breaker



## Accessories

## Field Fit Kit Catalog Numbers

2

## Alarm Lockout

Description	Pole Location	Frame		
		EG, JG and LG	NG	RG ①
Make/Break	Left	—	A1L5LPK	—
	Right	ALM1M1BEPK ②	A1L5RPK	A1L6RPK
2 Make/2 Break	Left	—	A2L5LPK	—
	Right	ALM2M2BEPK ③	A2L5RPK	A2L6RPK

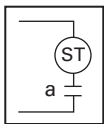
## Auxiliary Switch

Description	Pole Location	Frame		
		EG, JG and LG	NG	RG ①
1A, 1B	Left	—	A1X5PK	—
	Right	AUX1A1BPK	A1X5PK	—
2A, 2B	Left	—	A2X5PK	—
	Right	AUX2A2BPK	A2X5PK	A2X6RPK
3A, 3B	Left	—	A3X5LPK	—
	Right	—	A3X5RPK	—
4A, 4B	Left	—	—	—
	Right	—	—	A4X6RPK

## Auxiliary Switch/Alarm Lockout

Description	Pole Location	Frame		
		EG, JG and LG	NG	RG ①
—	Left	—	AA115LPK	—
	Right	AUXALRMEPK ④	AA115RPK	—

## Shunt Trip—Standard



## Shunt Trip—Standard

Description	Pole Location	Frame		
		EG, JG and LG ⑤	NG	RG ①
48–60 Vac	Left	SNT060CPK	SNT5LP05K	—
	Right	—	—	SNT6P05K
10–240 Vac	Left	SNT120CPK	SNT5LP11K	—
	Right	—	—	SNT6P11K
380–600 Vac	Left	SNT480CPK ⑥	—	—
	Right	—	—	—
220–250 Vdc or 380–440 Vac	—	—	SNT5LP14K	SNT6P14K
480–600 Vac	—	—	SNT5LP18K	SNT6P18K
12 Vdc	Left	SNT012CPK	—	—
	Right	—	—	—
24 Vac/dc	Left	SNT060CPK	SNT5LP03K	—
	Right	—	—	SNT6P03K
48–60 Vdc	Left	SNT060CPK	SNT5LP23K	—
	Right	—	—	SNT6P23K
110–125 Vdc	Left	SNT125DPK	SNT5LP26K	—
	Right	—	—	SNT6P26K

## Notes

- ① All accessories mount in the RH cavity which will accept one each of shunt trip, UVR, auxiliary switch and alarm switch.
- ② Part number for JG and LG is ALM1M1BJPK.
- ③ Part number for JG and LG is ALM2M2BJPK.
- ④ Part number for JG and LG is AUXALRMJPK.
- ⑤ LH cavity not available for EG frame with earth leakage module.
- ⑥ 380–600 Vdc, 50/60 Hz.

**Shunt Trip—Low Energy**

Description	Pole Location	Frame		
		EG, JG and LG	NG	RG ①
—	Left	—	LST5LPK	—
	Right	—	—	LST6RPK

**Undervoltage Release Mechanism**

Description	Pole Location	Frame		
		EG, JG and LG ③	NG	RG ①
110–127 Vac	Left	UVR120APK	UVH5LP08K	—
	Right	—	—	UVH6RP08K
208–240 Vac	Left	UVR240APK	UVH5LP11K	—
	Right	—	—	UVH6RP11K
24 Vdc	Left	UVR024DPK	UVH5LP21K ②	—
	Right	—	—	UVH6RP21K ②
24 Vac	Left	UVR024APK	UVH5LP21K ②	—
	Right	—	—	UVH6RP21K ②
48–60 Vdc	Left	UVR048DPK	UVH5LP23K	—
	Right	—	—	UVH6RP23K
48–60 Vac	Left	UVR048APK	UVH5LP05K	—
	Right	—	—	UVH6RP05K
120 Vdc	Left	UVR125DPK	UVH5LP26K	—
	Right	—	—	UVH6RP26K
220–250 Vdc	Left	UVR250DPK	UVH5LP28K	—
	Right	—	—	UVH6RP28K
380–500 Vac	Left	UVR480APK	UVH5LP29K	—
	Right	—	—	UVH6RP29K
525–600 Vac	Left	UVR600APK	—	—
	Right	—	—	—
12 Vdc	Left	—	UVH5LP20K	—
	Right	—	—	UVH6RP20K
12 Vac	Left	—	UVH5LP02K	—
	Right	—	—	UVH6RP02K

**Notes**

① All accessories mount in the RH cavity which will accept one each of shunt trip, UVR, auxiliary switch and alarm switch.

② 24 Vdc only use UVH5LP03K (NG) UVH6RP03K (RG) for 24 Vac.

③ LH cavity not available for EG frame with earth leakage module.



#### Series G Motor Operators



2

### Motor Operators

#### Product Description

Eaton's motor operator mechanism enables local and remote ON, OFF and reset switching of a circuit breaker. The motor operator is mounted on the circuit breaker cover within the dimensions of the circuit breaker.

The robust motor operators offer various voltages to maximize customer flexibility. Standard load transfer switching can be accomplished through the use of two circuit breakers fitted with motor operators and a mechanical interlock.

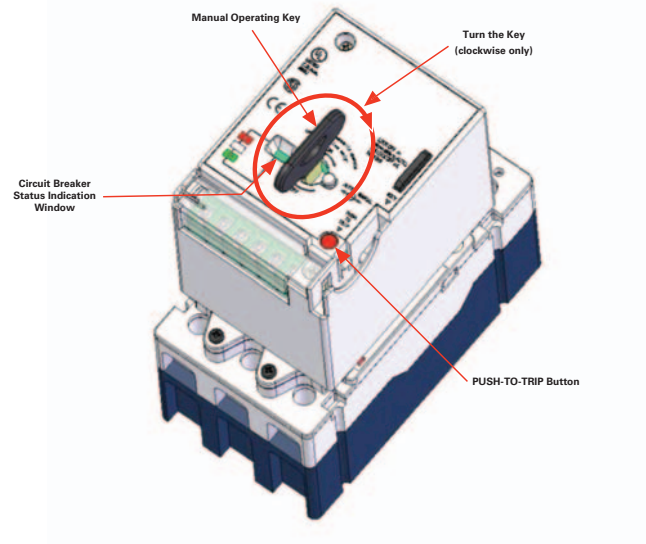
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**Features, Benefits and Functions**

The motor operator provides special features for ease of customer use and status indication.

- The motor operator allows the circuit breaker to be opened, closed or reset remotely
- The motor operator contains a motor connected to a cam drive mechanism. The cam drives a slide mechanism to operate the circuit breaker handle
- Internal limit switches and relays are used to control motor operation to prevent overdriving the circuit breaker handle and motor overload conditions
- A key is provided to manually operate the circuit breaker
- A special pull-out locking mechanism provides a method for padlocking the circuit breaker handle in the OFF position
- The locking device will accept three padlock shackles with a maximum diameter of 1/4-inch (6.4 mm) each
- The cover provides visual status of the circuit breaker: ON, OFF or TRIPPED. A PUSH-TO-TRIP button allows the user to manually trip the breaker



**Standards and Certifications**

The motor operators are UL and CSA listed, and CE marked.



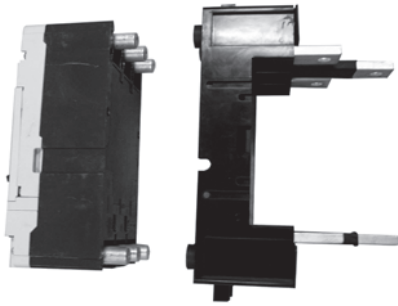
**Product Selection**

**Motor Operators**

Frame	Voltage	Frequency	Inrush Current	Catalog Number
Series G E-Frame	100–240 Vac	50/60 Hz	1A	<b>MOPEG240C</b>
	100–220 Vdc	DC	1A	<b>MOPEG240C</b>
	24/48 Vdc	DC	3A	<b>MOPEG48D</b>
Series C F-Frame	208–240 Vac	50/60 Hz	1A	<b>MOPFD240C</b>
	110–127 Vac	50/60 Hz	1A	<b>MOPFD120C</b>
	220–250 Vdc	DC	1A	<b>MOPFD240C</b>
	110–125 Vdc	DC	1A	<b>MOPFD120C</b>
	24 Vdc	DC	3A	<b>MOPFD24D</b>
Series G J-Frame	208–240 Vac	50/60 Hz	1A	<b>MOPJG240C</b>
	110–127 Vac	50/60 Hz	1A	<b>MOPJG120C</b>
	220–250 Vdc	DC	1A	<b>MOPJG240C</b>
	110–125 Vdc	DC	1A	<b>MOPJG120C</b>
	24 Vdc	DC	3A	<b>MOPJG24D</b>
Series G L-Frame	208–240 Vac	50/60 Hz	2A	<b>MOPLG240C</b>
	110–127 Vac	50/60 Hz	2A	<b>MOPLG120C</b>
	220–250 Vdc	DC	2A	<b>MOPLG240C</b>
	110–125 Vdc	DC	2A	<b>MOPLG120C</b>
	24 Vdc	DC	6A	<b>MOPLG24D</b>

#### LG Breaker with Plug-In Block

2



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### Plug-In Blocks

#### Product Description

Plug-in adapters simplify installation and front removal of circuit breakers. Plug-ins are available for rear connection applications on three- and four-pole circuit breakers. Trip on drawout interlock kits are included. Stabs for EG, JG and LG plug-ins rotate 90° for flexible installation. Use terminal shields for IP30 protection.

#### Product Selection

##### Plug-In Blocks

Breaker Frame	Number of Poles	Catalog Number
<b>EG-, JG- and LG-Frame Plug-In Blocks</b>		
EG	3	PAD3E
EG	4	PAD4E
JG	3	PAD3J
JG	4	PAD4J
LG	3	PAD3L
LG	4	PAD4L
<b>Trip-On Drawout Interlock Kit <sup>①</sup></b>		
EG	3, 4	PIILEG
JG	3, 4	PIILJG
LG	3, 4	PIILLG
<b>Terminal Shields IP30</b>		
EG	3	EFTS3K
EG	4	EFTS4K
JG	3	FJTS3K
JG	4	FJTS4K
LG	3	LTS3K
LG	4	LTS4K
<b>Position Switch</b>		
EG	3, 4	PADILE
JG	3, 4	PADILJ
LG	3, 4	PADILL

#### Note

<sup>①</sup> Included with plug-in block. Trips the breaker when breaker is removed from plug-in block.

**Drawout Cassettes**



**Drawout Cassette**

**Product Description**

The drawout cassette is available for use with JG, LG and NG, three- and four-pole breakers. The cassettes consist of two separate components: the movable mechanism, which attaches to the breaker, and the stationary mechanism, which houses in the cassette. For the JG, LG and NG drawout cassettes, all necessary parts for installation are included in the one catalog number.

**Features**

Features of the drawout cassettes for the JG, LG and NG include:

- Trip on drawout—breaker will trip if it is in the ON position when withdrawn from the cassette
- Secondary terminal block—the drawout cassettes include a secondary terminal block for easier access when wiring low voltage accessories, including shunts and undervoltage releases

The drawout mechanism has three primary positions:

- Connected—the breaker is fully connected to the primary stabs and secondary contacts
- Disconnected—both the primary stabs and the secondary contacts are disconnected
- Withdraw—the breaker can be removed from the cassette

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Drawout Cassette	

**Product Selection**

**JG Drawout Cassette**



**LG Drawout Cassette**



**JG, LG and NG Drawout Cassettes**

Breaker Frame	Number of Poles	Catalog Number
JG	3	<b>JG3DOM</b>
	4	<b>JG4DOM</b>
LG	3	<b>LG3DOM</b>
	4	<b>LG4DOM</b>
NG	3	<b>NG3DOM</b>
	4	<b>NG4DOM</b>

**Molded Case Circuit Breaker Product Family**



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F-Frame (10–225 Amperes) . . . . .	<b>V4-T2-129</b>
J-Frame (70–250 Amperes) . . . . .	<b>V4-T2-146</b>
K-Frame (70–400 Amperes) . . . . .	<b>V4-T2-154</b>
L-Frame (125–600 Amperes) . . . . .	<b>V4-T2-179</b>
M-Frame (300–800 Amperes) . . . . .	<b>V4-T2-205</b>
N-Frame (400–1200 Amperes) . . . . .	<b>V4-T2-216</b>
R-Frame (800–2500 Amperes) . . . . .	<b>V4-T2-231</b>
Motor Circuit Protectors (MCP) . . . . .	<b>V4-T2-250</b>
Motor Protection Circuit Breakers (MPCB) . . . . .	<b>V4-T2-261</b>
Type ELC Current Limiter Attachment (Size 0–4) . . . . .	<b>V4-T2-263</b>
Current Limiting Circuit Breaker Module . . . . .	<b>V4-T2-264</b>
Internal Accessories . . . . .	<b>V4-T2-268</b>
External Accessories . . . . .	<b>V4-T2-299</b>



Learn Online



Drawings Online

**Product Overview**

Eaton’s molded case circuit breakers are designed to provide circuit protection for low voltage distribution systems. They are described by NEMA as, “... a device for closing and interrupting a circuit between separable contacts under both normal and abnormal conditions,” and furthermore as, “... a breaker assembled as an integral unit in a supporting and enclosing housing of insulating material.” The National Electrical Code (NEC) describes them as, “A device designed to open and close a circuit by non-automatic means, and to open the circuit automatically on a predetermined overload of current, without injury to itself when properly applied within its rating.”

So designed, Eaton circuit breakers protect conductors against overloads and conductors and connected apparatus, such as motors and motor starters, against short circuits.

In low voltage distribution systems, there are many varied applications of molded case circuit breakers.

Eaton offers the most comprehensive family of molded case circuit breakers in the industry.

This section of circuit breakers includes:

- Thermal-magnetic trip breakers
- Electronic rms trip breakers
- Molded case switches
- Motor circuit protectors
- Current limiting breakers
- Special application breakers

**Modified Breakers**

Eaton breakers can be ordered with internal accessories installed. These modified breakers will be subject to an addition charge.

**Special Calibration**

Special non-UL-listed calibrations are available for certain ambient temperatures other than 40°C and for frequencies other than 50/60 Hz or DC. Reduced interrupting ratings will apply for 400 Hz applications.

**50°C Calibration**

Add suffix **V** to catalog Number for complete breaker, listed above, when ordering listed ampere ratings for breakers to be used in 50°C ambients. (No price adder.) (No UL label.)

**Moisture-Fungus Treatment**

All circuit breaker cases are molded from glass-polyester which does not support the growth of fungus. Any parts which are susceptible to the growth of fungus will require special treatment.

**Freeze-Tested Circuit Breakers**

The circuit breakers may be ordered with freeze testing. This option uses special lubrication and mechanical operation is verified at –40°C.

**Marine Applications**

E- to R-Framed circuit breakers can be supplied to meet the following marine specifications:

- U.S. Coast Guard CFR 46; ABS—American Bureau of Shipping; IEEE 45; DNV; Lloyds; and ABS/NVR

These specifications generally require molded case circuit breakers to be supplied with 50°C ambient, and plug-in adapter kits. When plug-in adapter kits are used, no terminals need be supplied (switchboard applications).

Circuit breakers can also be supplied to meet UL 489 Supplement SA (Marine use) and UL 489 Supplement SB (Naval Use).

UL 489 Supplement SA applies to vessels over 65 feet (19.8 m) in length. Requirements include 40°C ambient calibration, special labeling, and no use of aluminum conductors or terminals. (No 50°C.)

- Suffix H08

Or you can choose to add 50°C ambient but then there is no “UL” mark.

- Suffix VH08

UL 489 Supplement SB requires partial 50°C ambient calibration, vibration testing, special nameplating and no use of aluminum conductors or terminals. Eaton chooses to always fully calibrate to 50°C ambient. (“Naval” labeled per UL, and UL now allows 50°C label here.)

- Suffix VH09

**Certified Test Reports**

Eaton breakers can be ordered with certified test reports at the time of order entry. Test report documents the thermal and magnetic or electronic tripping characteristics of the individual breaker. Breaker and test report must be ordered together. Add suffix 12 to breaker catalog number and enter separate line item on order for certified test report.

**Standards and Certifications**

Molded case circuit breakers are designed to conform with the following standards:

- Underwriters Laboratories Inc., Standard UL 489, molded case circuit breakers and circuit breaker enclosures
- National Electrical Manufacturers Association (NEMA) Standards Publication No. AB1-1993, molded case circuit breakers
- Australian Standard AS 2184, molded case circuit breakers
- British Standards Institution Standard BS 4752: Part 1, switchgear and control gear Part 1: circuit breakers
- Canadian Standards Association (CSA) Standard C22.2 No. 5, service entrance and branch circuit breakers
- International Electrotechnical Commission Recommendations IEC 60947-2, circuit breakers
- Japanese T-Mark Standard molded case circuit breakers
- South African Bureau of Standards, Standard SABS 156, Standard Specification for molded case circuit breakers
- Swiss Electro-Technical Association Standard SEV 157-1, safety regulations for circuit breakers
- Union Technique de l'Electricite Standard NF C 63-120, low voltage switchgear and control gear circuit breaker requirements
- Verband Deutscher Elektrotechniker (Association of German Electrical Engineers) Standard VDE 0660, low voltage switchgear and control gear, circuit breakers

Conformance with these standards satisfies most local and international codes, assuming user acceptability and simplified application.

Molded case circuit breakers equal or exceed Federal Specification Classification W-C-375b requirements for the particular class associated with the circuit breaker frame being considered.

Open breakers do not have service entrance ratings. Service entrance rating is part of the enclosure.



# 2.3

## Molded Case Circuit Breakers

### Series C

#### Quick Reference

#### Industrial Circuit Breakers

2

#### G-Frame

Circuit Breaker Type	Continuous Ampere Rating at 40°C	No. of Poles	Volts		Type of Trip <sup>①</sup>	Federal Specification W-C-375b	UL Listed Interrupting Ratings (rms Symmetrical Amperes)								Page Number
			AC	DC			AC (kA)				DC (kA) <sup>②</sup>				
							120	120/240	240	277	480	600	125	250	
GHB	15-100	1	120	125	N.I.T.U.	11a	65	—	—	—	—	—	14	—	V4-T2-120
GHB	15-100	2, 3	240	125/250	N.I.T.U.	11a10b, 11b	—	—	65	—	—	—	—	14	V4-T2-120
GHB	15-100	1	277	125	N.I.T.U.	12b, 14b	—	—	—	14	—	—	14	—	V4-T2-120
GHB	15-100	2, 3	480Y/277	125/250	N.I.T.U.	15b	—	—	—	14	14	—	—	14	V4-T2-120
HGHB	15-30	11	277	125	N.I.T.U.	12c, 13a, 13b	65	—	—	25	—	—	14	—	V4-T2-120
GHQ	15-20	1	277	—	N.I.T.U.	—	65	—	—	14	—	—	—	—	V4-T2-120
GHBS	15-30	1, 2	480Y/277	—	—	—	65	65	—	14	—	—	—	—	V4-T1-34
GBHS	15-20	1, 2	600Y/347	—	N.I.T.U.	—	—	—	—	—	—	10	—	—	V4-T1-34
GDB	15-50	2	480	125/250	N.I.T.U.	—	—	—	—	14	—	—	10	—	V4-T2-118
GDB	15-100	3	480	250	N.I.T.U.	—	—	—	—	14	—	—	10	—	V4-T2-118
GD	15-50	2	480	125/250	N.I.T.U.	13b	—	—	65	—	14	—	—	10	V4-T2-117
GD	15-100	3	480	250	N.I.T.U.	13b	—	—	65	—	22	—	—	10	V4-T2-117
GHC	15-100	1	120	125	N.I.T.U.	12c, 13a	65	—	—	—	—	—	14	—	V4-T2-125
GHC	15-100	2, 3	240	125/250	N.I.T.U.	13b	—	—	65	—	—	—	—	1	V4-T2-125
GHC	15-100		277	125	N.I.T.U.	12c, 13a	—	—	—	14	—	—	14	—	V4-T2-125
GHC	15-100	2, 3	480Y/277	125/250	N.I.T.U.	13b	—	—	—	14	14	—	—	14	V4-T2-125
HGHC	15-30	1	277	125	N.I.T.U.	—	65	—	—	25	—	—	14	—	V4-T2-125

#### Notes

- ① N.I.T.U. is non-interchangeable trip unit and I.T.U. is interchangeable trip unit.
- ② Two-pole circuit breaker, or two poles of three-pole circuit breaker at 250 Vdc.

## F-Frame

Circuit Breaker Type	Continuous Ampere Rating at 40°C	No. of Poles	Volts		Type of Trip ①	Federal Specification W-C-375b	UL Listed Interrupting Ratings (rms Symmetrical Amperes)								Page Number
			AC	DC			AC (kA)				DC (kA) ②				
							120	120/240	240	277	480	600	125	250	
EDB	100–225	2, 3	240	125	N.I.T.U.	—	—	—	22	—	—	—	10	—	V4-T2-129
EDS	100–225	2, 3	240	125	N.I.T.U.	—	—	—	42	—	—	—	10	—	V4-T2-129
ED	15–225	2, 3	240	125	N.I.T.U.	12b	—	—	65	—	—	—	10	—	V4-T2-129
EDH	100–225	2, 3	240	125	N.I.T.U.	14b	—	—	100	—	—	—	10	—	V4-T2-129
EDC	100–225	2, 3	240	125	N.I.T.U.	1	—	—	200	—	—	—	10	—	V4-T2-129
EHD	15–100	1	277	125	N.I.T.U.	13a	—	—	—	14	—	—	10	—	V4-T2-129
EHD	15–100	2, 3	480	250	N.I.T.U.	13b	—	—	18	—	14	—	10	—	V4-T2-129
FDB	15–150	2, 3	600	250	N.I.T.U.	18a	—	—	18	—	14	14	—	10	V4-T2-129
FDB	15–150	4	600	250	N.I.T.U.	③	—	—	18	—	14	14	—	10	V4-T2-129
FD	15–150	1	277	125	N.I.T.U.	13a	—	—	—	35	—	—	10	—	V4-T2-129
FD	15–225	2, 3	600	250	N.I.T.	22a	—	—	65	—	35	18	—	10	V4-T2-129
FD	15–225	4	600	250	—	③	—	—	65	—	35	18	—	10	V4-T2-129
FDE	15–225	3	600	—	N.I.T.	—	—	—	65	—	35	18	—	—	V4-T2-129
HFD	15–150	1	277	125	N.I.T.U.	13a	—	—	—	65	—	—	10	—	V4-T2-129
HFD	15–225	2,3	600	250	—	22a	—	—	100	—	65	25	—	22	V4-T2-129
HFD	15–225	4	600	250	—	③	—	—	100	—	65	25	—	22	V4-T2-129
HFDE	15–225	3	600	—	N.I.T.	—	—	—	100	—	65	25	—	—	V4-T2-129
FDC ④	15–225	2, 3	600	250	N.I.T.U.	24a	—	—	200	—	100	35	—	22	V4-T2-129
FDC ④	15–225	4	600	250	—	③	—	—	200	—	100	35	—	22	V4-T2-129
FDCE ④⑤	15–225	3	600	—	N.I.T.	—	—	—	200	—	100	25	—	—	V4-T2-129

**Notes**

- ① N.I.T.U. is non-interchangeable trip unit and I.T.U. is interchangeable trip unit.  
 ② Two-pole circuit breaker, or two poles of three-pole circuit breaker at 250 Vdc.  
 ③ Not defined in W-C-375b.  
 ④ Current limiting.  
 ⑤ Check with Eaton for availability.



# 2.3

## Molded Case Circuit Breakers

### Series C

2

#### J-Frame

Circuit Breaker Type	Continuous Ampere Rating at 40°C	No. of Poles	Volts		Type of Trip ①	Federal Specification W-C-375b	UL Listed Interrupting Ratings (rms Symmetrical Amperes)								Page Number
			AC	DC			AC (kA)				DC (kA) ②				
							120	120/240	240	277	480	600	125	250	
JDB	70–250	2, 3	600	250	N.I.T.U.	22a	—	—	65	—	35	18	—	10	V4-T2-149
JD	70–250	2, 3, 4	600	250	I.T.U.	22a	—	—	65	—	35	18	—	10	V4-T2-148
HJD	70–250	2, 3, 4	600	250	I.T.U.	22a	—	—	100	—	65	25	—	22	V4-T2-148
JDC ③	70–250	2, 3, 4	600	250	I.T.U.	22a	—	—	200	—	100	35	—	22	V4-T2-148

#### K-Frame

Circuit Breaker Type	Continuous Ampere Rating at 40°C	No. of Poles	Volts		Type of Trip ①	Federal Specification W-C-375b	UL Listed Interrupting Ratings (rms Symmetrical Amperes)								Page Number
			AC	DC			AC (kA)				DC (kA) ②				
							120	120/240	240	277	480	600	125	250	
DK	250–400	2, 3	240	250	N.I.T.U.	14b	—	—	65	—	—	—	—	10	V4-T2-160
KDB	100–400	2, 3	600	250	N.I.T.U.	23a	—	—	65	—	35	25	—	10	V4-T2-160
KD	100–400	2, 3, 4	600	250	I.T.U.	23a	—	—	65	—	35	25	—	10	V4-T2-157, V4-T2-158, V4-T2-163, V4-T2-166
CKD	100–400	2, 3, 4	600	250	I.T.U.	23a	—	—	65	—	35	25	—	—	V4-T2-162, V4-T2-169, V4-T2-171
HKD	100–400	2, 3, 4	600	250	I.T.U.	23a	—	—	100	—	65	35	—	22	V4-T2-157, V4-T2-158, V4-T2-163, V4-T2-166
CHKD	100–400	2, 3, 4	600	250	I.T.U.	23a	—	—	100	—	65	35	—	—	V4-T2-162, V4-T2-169, V4-T2-171
KDC ③	100–400	2, 3, 4	600	250	I.T.U.	23a	—	—	200	—	100	65	—	22	V4-T2-157, V4-T2-158, V4-T2-163, V4-T2-166

#### L-Frame

Circuit Breaker Type	Continuous Ampere Rating at 40°C	No. of Poles	Volts		Type of Trip ①	Federal Specification W-C-375b	UL Listed Interrupting Ratings (rms Symmetrical Amperes)								Page Number
			AC	DC			AC (kA)				DC (kA) ②				
							120	120/240	240	277	480	600	125	250	
LDB	300–600	2, 3	600	250	N.I.T.U.	23a	—	—	65	—	35	25	—	22	V4-T2-185
LD	300–600	2, 3, 4	600	250	I.T.U.	23a	—	—	65	—	35	25	—	22	V4-T2-181, V4-T2-182, V4-T2-189
CLD	300–600	2, 3, 4	600	250	I.T.U.	23a	—	—	65	—	35	25	—	—	V4-T2-184, V4-T2-195
HLD	300–600	2, 3, 4	600	250	I.T.U.	23a	—	—	100	—	65	35	—	25	V4-T2-181, V4-T2-182, V4-T2-189
CHLD	300–600	2, 3, 4	600	250	I.T.U.	23a	—	—	100	—	65	35	—	—	V4-T2-184, V4-T2-195
LDC ③	300–600	2, 3, 4	600	250	I.T.U.	23a	—	—	200	—	100	50	—	30	V4-T2-181, V4-T2-182, V4-T2-191
CLDC ③	300–600	2, 3, 4	600	250	I.T.U.	23a	—	—	200	—	100	50	—	30	V4-T2-184, V4-T2-197

#### M-Frame

Circuit Breaker Type	Continuous Ampere Rating at 40°C	No. of Poles	Volts		Type of Trip ①	Federal Specification W-C-375b	UL Listed Interrupting Ratings (rms Symmetrical Amperes)								Page Number
			AC	DC			AC (kA)				DC (kA) ②				
							120	120/240	240	277	480	600	125	250	
MDL	300–800	2, 3	600	250	I.T.U.	23a	—	—	65	—	50	25	—	22	V4-T2-207, V4-T2-209
CMDL	300–800	2, 3	600	250	I.T.U.	23a	—	—	65	—	50	25	—	—	V4-T2-210
HMDL	300–800	2, 3	600	250	I.T.U.	23a	—	—	100	—	65	35	—	25	V4-T2-207, V4-T2-209
CHMDL	300–800	2, 3	600	250	I.T.U.	23a	—	—	100	—	65	35	—	—	V4-T2-210

#### Notes

- ① N.I.T.U. is non-interchangeable trip unit and I.T.U. is interchangeable trip unit.
- ② Two-pole circuit breaker, or two poles of three-pole circuit breaker at 250 Vdc.
- ③ Current limiting.

**Molded Case Circuit Breaker Product Family**



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L-Frame (125–600 Amperes) . . . . .	<b>V4-T2-179</b>
M-Frame (300–800 Amperes) . . . . .	<b>V4-T2-205</b>
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**G-Frame (15–100 Amperes)**

**Product Description**

- All two- and three-pole circuit breakers are of the common trip type. On all three-phase delta (240V) Grounded B phase applications, refer to Eaton
- Single-pole circuit breakers, 15 and 20 amperes. Switching duty rated (SWD) for fluorescent lighting applications
- All G-Frame circuit breakers are suitable for reverse feed use
- HACR rated

# 2.3

## Molded Case Circuit Breakers

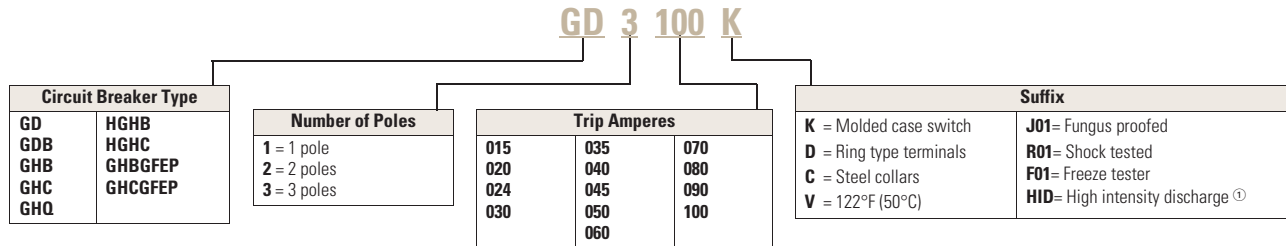
### Series C

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#### Catalog Number Selection

This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

#### Circuit Breaker/Frame



#### Technical Data and Specifications

#### UL 489 Interrupting Capacity Ratings

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)						
		Volts AC (50/60 Hz)				Volts DC		
		120	240	277	480	480Y/277	125	250 ②③
GDB	2, 3	—	—	—	14	—	—	10
GD	2	—	65	—	14	—	—	10
GD	3	—	65	—	22	—	—	10
GHQ	—	65	—	14	—	—	—	—
GHB	1	65	—	14	—	—	14	—
GHB	2, 3	—	65	—	—	14	14	—
HGHB	1	65	—	25	—	—	14	—
GHC	1	65	—	14	—	—	14	—
GHC	2, 3	—	65	—	—	14	14	—
HGHC	1	65	—	25	—	—	14	—

#### Terminal Types

For line and load-side. Terminals are UL listed as suitable for wire type and size given below.

#### Terminal Types

Circuit Breaker Amperes	Terminal Type Material	Screw Head Type	Wire Type	AWG Wire Range	Metric Wire Range (mm <sup>2</sup> ) ④
<b>Standard</b>					
15–20	Clamp (plated steel)	Slotted	Cu/Al	14–10	2.5–4
25–100	Pressure (aluminum body)	Slotted	Cu/Al	10–1/0	4–50
<b>Optional—GD Only</b>					
15–100	Pressure (steel body)	Slotted	Cu	14–3	—

#### Notes

- ① HID suffix only applies to the GHB and GHC single-pole, 15–20A circuit breakers.
- ② Time constant is 8 milliseconds minimum.
- ③ Two poles of three-pole circuit breaker.
- ④ Not UL listed sizes.

Typical G-Frame Circuit Breaker



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**Type GD Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units (15–100 Amperes)**

**Product Description**

- Cable in, cable out
- Includes mounting hardware and BMHE

**Standards and Certifications**

- UL/CSA



**Product Selection**

**Type GD Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units**

Maximum Continuous Ampere Rating at 40°C	480 Vac Maximum, 250 Vdc		Includes Binding Head Screws and Clamps 10–32 x 0.312 Three-Pole Catalog Number
	14 kAIC at 480 Vac Includes Line and Load Terminals Two-Pole Catalog Number	22 kAIC at 480 Vac Three-Pole Catalog Number	
15	GD2015	GD3015	GD3015D
20	GD2020	GD3020	GD3020D
25	GD2025	GD3025	GD3025D
30	GD2030	GD3030	GD3030D
35	GD2035	GD3035	GD3035D
40	GD2040	GD3040	GD3040D
45	GD2045	GD3045	GD3045D
50	GD2050	GD3050	GD3050D
60	—	GD3060	GD3060D
70	—	GD3070	GD3070D
80	—	GD3080	GD3080D
90	—	GD3090	GD3090D
100	—	GD3100	GD3100D

**Type GDB Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units**

Maximum Continuous Ampere Rating at 40°C	480 Vac Maximum, 250 Vdc 14 kAIC at 480 Vac Includes Line and Load Terminals	
	Two-Pole Catalog Number	Three-Pole Catalog Number
15	GDB2015	GDB3015
20	GDB2020	GDB3020
25	GDB2025	GDB3025
30	GDB2030	GDB3030
35	GDB2035	GDB3035
40	GDB2040	GDB3040
45	GDB2045	GDB3045
50	GDB2050	GDB3050
60	—	GDB3060
70	—	GDB3070
80	—	GDB3080
90	—	GDB3090
100	—	GDB3100

**Type GD Molded Case Switches****Type GD Molded Case Switches—Three-Pole**

Maximum Continuous Ampere Rating at 40°C	480 Vac Maximum, 250 Vdc Catalog Number (Includes Line and Load Terminals)
	60
60	GD3060KC <sup>①</sup>
100	GD3100K
100	GD3100KD <sup>②</sup>

**Notes**

<sup>①</sup> Includes line and load steel terminals.

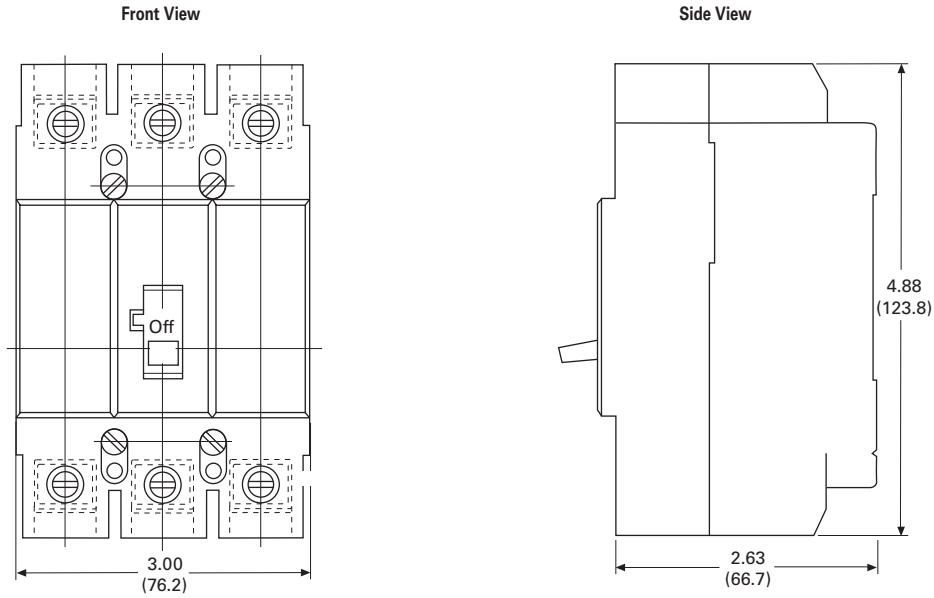
<sup>②</sup> Includes binding head screws and clamps 10–32 x 0.312.

Molded case switches may open above 1300 amperes.

**Dimensions**

Approximate Dimensions in Inches (mm)

**GD-Frame, Three-Pole**



Typical GHB



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K-Frame (70–400 Amperes) . . . . .	<b>V4-T2-154</b>
L-Frame (125–600 Amperes) . . . . .	<b>V4-T2-179</b>
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### Types GHB and HGHB Bolt-On Panelboard Circuit Breakers (15–100 Amperes)

#### Standards and Certifications

These breakers meet the requirements of Federal Specification W-C-375b as follows:

- Type GHB, 120 and 240V:
  - Single-pole: Class 11a
  - Two-, three-pole: Classes 10b, 11b, 12b, 14b, 15b
  - UL/CSA
- Type GHB, 277 and 480Y/277V:
  - Single-pole: Classes 12c, 13a
  - Two-, three-pole: Class 13b
  - Type HGHB 277V
  - Type GHQ 277V



## Product Selection

2

Typical GHB



### Type GHB Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units <sup>①</sup>

Continuous Ampere Rating at 40°C	277/480 Vac Maximum, 125 Vdc Maximum <sup>②</sup>		277/480 Vac Maximum, 125/250 Vdc Maximum		277/480 Vac Maximum, 125/250 Vdc Maximum <sup>③</sup>	
	Single-Pole Catalog Number	Two-Pole Catalog Number	Single-Pole Catalog Number	Two-Pole Catalog Number	Single-Pole Catalog Number	Two-Pole Catalog Number
15	GHB1015 <sup>④⑤</sup>	GHB2015 <sup>④</sup>	GHB1015 <sup>④⑤</sup>	GHB2015 <sup>④</sup>	GHB3015 <sup>④</sup>	GHB3015 <sup>④</sup>
20	GHB1020 <sup>④⑤</sup>	GHB2020 <sup>④</sup>	GHB1020 <sup>④⑤</sup>	GHB2020 <sup>④</sup>	GHB3020 <sup>④</sup>	GHB3020 <sup>④</sup>
25	GHB1025	GHB2025	GHB1025	GHB2025	GHB3025	GHB3025
30	GHB1030	GHB2030	GHB1030	GHB2030	GHB3030	GHB3030
35	GHB1035	GHB2035	GHB1035	GHB2035	GHB3035	GHB3035
40	GHB1040	GHB2040	GHB1040	GHB2040	GHB3040	GHB3040
45	GHB1045	GHB2045	GHB1045	GHB2045	GHB3045	GHB3045
50	GHB1050	GHB2050	GHB1050	GHB2050	GHB3050	GHB3050
60	GHB1060	GHB2060	GHB1060	GHB2060	GHB3060	GHB3060
70	GHB1070	GHB2070	GHB1070	GHB2070	GHB3070	GHB3070
80	GHB1080	GHB2080	GHB1080	GHB2080	GHB3080	GHB3080
90	GHB1090	GHB2090	GHB1090	GHB2090	GHB3090	GHB3090
100	GHB1100	GHB2100	GHB1100	GHB2100	GHB3100	GHB3100

### Type HGHB Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units

Continuous Ampere Rating at 40°C	277 Vac Maximum, 125 Vdc Maximum	
	Single-Pole Catalog Number	Two-Pole Catalog Number
15	HGHB1015 <sup>⑥</sup>	HGHB2015 <sup>⑥</sup>
20	HGHB1020 <sup>⑥</sup>	HGHB2020 <sup>⑥</sup>
25	HGHB1025	HGHB2025
30	HGHB1030	HGHB2030

### Type GHQ Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units

Continuous Ampere Rating at 40°C	277 Vac Maximum 14 kAIC, No DC Rating (HID and SWD)	
	Single-Pole Catalog Number	Two-Pole Catalog Number
15	GHQ1015 <sup>⑦</sup>	GHQ2015 <sup>⑦</sup>
20	GHQ1020 <sup>⑦</sup>	GHQ2020 <sup>⑦</sup>

#### Notes

- ① 480Y/277V, circuit breakers (Type GHB) not suitable for three-phase delta (480V).
- ② 15 through 70 ampere circuit breakers only.
- ③ Use two outside poles.
- ④ Uses 0.190 (4.83) –32 screw type clamp terminals.
- ⑤ Add suffix HID for High Intensity Discharge (HID) applications. 15 and 20 ampere, single-pole are SWD rated.
- ⑥ 15 and 20 ampere, single-pole are SWD rated.
- ⑦ Includes 4A33462H01 load clip.



# 2.3

## Molded Case Circuit Breakers

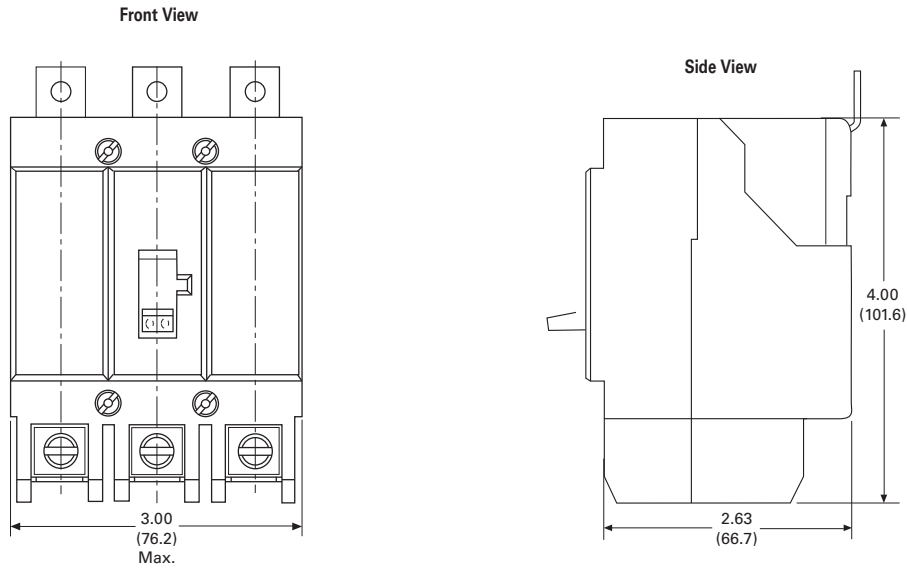
### Series C

#### Dimensions

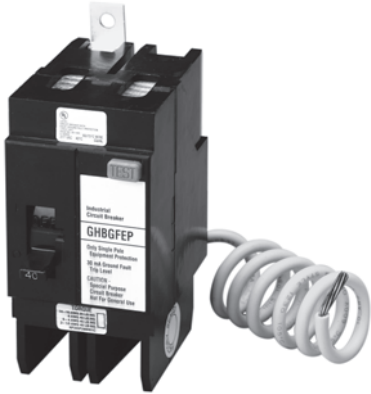
Approximate Dimensions in Inches (mm)

2

#### GDB-Frame, Three-Pole



Single-Phase (requires two poles)



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**Type GHBGFEP Bolt-On Panelboard 30 mA Industrial Ground Fault Circuit Protectors (15–100 Amperes)**

**Product Description**

- 15–60 amperes, 277V, 50/60 Hz
- Operational voltage 240V to 305V

**Standards and Certifications**

These circuit breakers meet the requirements of UL 489 and UL 1053.



**Product Selection**

**Type GHBGFEP Bolt-On Panelboard 30 mA Industrial Ground Fault Circuit Protectors with Non-Interchangeable Trip Units**

Continuous Ampere Rating at 40°C	Single-Phase (Requires Two Poles) 277 Vac, 30 mA Catalog Number
15	GHBGFEP1015
20	GHBGFEP1020
30	GHBGFEP1030
40	GHBGFEP1040
50	GHBGFEP1050
60	GHBGFEP1060

**Technical Data and Specifications**

**Interrupting Capacity Ratings**

Circuit Breaker Type	Number of Poles	Interrupting Capacity (Symmetrical Amperes) 277 Vac (50/60 Hz)
GHBGFEP	1	14,000

# 2.3

## Molded Case Circuit Breakers

### Series C

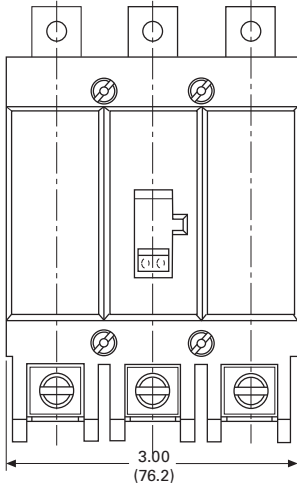
#### Dimensions

Approximate Dimensions in Inches (mm)

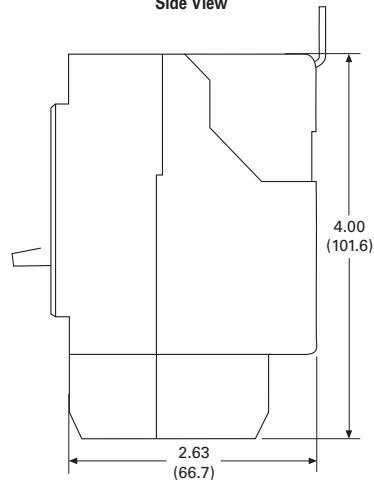
2

#### GHB-Frame, Three-Pole

Front View



Side View



Typical GHC



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**Types GHC and HGHC Circuit Breakers (15–100 Amperes)**

**Product Description**

- 15–100 amperes
- 120, 240, 277, 480Y/277V, 50/60 Hz, 125, 125/250 Vdc
- Single-, two- and three-pole
- Cable in, cable out
- Does not include mounting hardware

**Standards and Certifications**

These breakers meet the requirements of Federal Specification W-C-37b as follows:

- Type GHC, 277 and 480Y/277V:
  - Single-pole: Classes 12c, 13a
  - Two-, three-pole: Class 13b
  - UL/CSA



## Product Selection

## 2

## Type GHC Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units

Continuous Ampere Rating at 40°C	277 Vac Maximum, 125 Vdc Maximum ①	480Y/277 Vac Maximum, 125/250 Vdc Maximum	480Y/277 Vac Maximum, 125/250 Vdc Maximum ②
	Single-Pole Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number
15	GHC1015 ③④	GHC2015 ③	GHC3015 ③
20	GHC1020 ③④	GHC2020 ③	GHC3020 ③
25	GHC1025	GHC2025	GHC3025
30	GHC1030	GHC2030	GHC3030
35	GHC1035	GHC2035	GHC3035
40	GHC1040	GHC2040	GHC3040
45	GHC1045	GHC2045	GHC3045
50	GHC1050	GHC2050	GHC3050
60	GHC1060	GHC2060	GHC3060
70	GHC1070	GHC2070	GHC3070
80	GHC1080	GHC2080	GHC3080
90	GHC1090	GHC2090	GHC3090
100	GHC1100	GHC2100	GHC3100

## Type HGHC Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units

Continuous Ampere Rating at 40°C	277 Vac Maximum, 125 Vdc Maximum
	Single-Pole Catalog Number
15	HGHC1015 ⑤
20	HGHC1020 ⑤
25	HGHC1025
30	HGHC1030

**Notes**

- ① 15 through 70 ampere circuit breakers only.
- ② Use two outside poles.
- ③ Uses 0.190–32 screw type clamp terminals.
- ④ Add suffix HID for High Intensity Discharge (HID) applications. 15 and 20 ampere, single-pole are SWD rated.
- ⑤ 15 and 20 ampere, single-pole are SWD rated.

Single-Phase (requires two-pole spaces)



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**Type GHCGFEP Cable-In/Cable-Out 30 mA Industrial Ground Fault Circuit Protectors (15–100 Amperes)**

**Product Description**

- 15–60 amperes, 277V, 50/60 Hz
- Operational voltage 240V–305V

**Standards and Certifications**

These circuit breakers meet the requirements of UL 489 and UL 1053.



**Product Selection**

**Type GHCGFEP 30 mA Industrial Ground Fault Circuit Protectors with Non-Interchangeable Trip Units**

Continuous Ampere Rating at 40°C	Single-Phase (Requires Two Poles) 277V, 30 mA	
		Catalog Number
15		GHCGFEP1015
20		GHCGFEP1020
30		GHCGFEP1030
40		GHCGFEP1040
50		GHCGFEP1050
60		GHCGFEP1060

**Technical Data and Specifications**

**Interrupting Capacity Ratings**

Circuit Breaker Type	Number of Poles	Interrupting Capacity (Symmetrical Amperes)	
			277 Vac (50/60 Hz)
GHCGFEP	1		14,000

#### Special Purpose Circuit Breakers

2



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### Special Purpose GHC Circuit Breakers (15–100 Amperes)

#### Product Description

Eaton's Type GHC circuit breakers have binding head screw-type terminals on line and load side. These circuit breakers with screw-type terminals (0.190–32) will be marked "Special purpose breaker not for general use." To order this special breaker, use the catalog number from the tables on this page.

#### Product Selection

##### Type GHC Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units

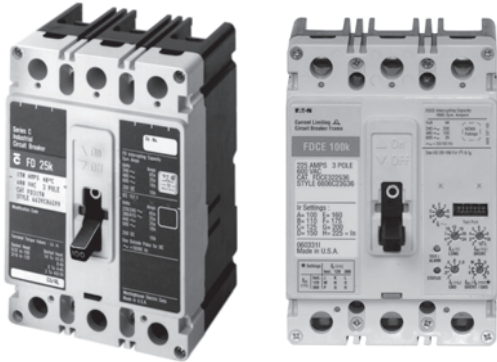
Continuous Ampere Rating at 40°C	277 Vac Maximum, 125 Vdc Maximum	480Y/277 Vac Maximum, 125/250 Vdc Maximum	480Y/277 Vac Maximum, 125/250 Vdc Maximum <sup>①</sup>
	Single-Pole Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number
25	GHC1025D	GHC2025D	GHC3025D
30	GHC1030D	GHC2030D	GHC3030D
35	GHC1035D	GHC2035D	GHC3035D
40	GHC1040D	GHC2040D	GHC3040D
45	GHC1045D	GHC2045D	GHC3045D
50	GHC1050D	GHC2050D	GHC3050D
60	GHC1060D	GHC2060D	GHC3060D
70	GHC1070D	GHC2070D	GHC3070D
80	GHC1080D	GHC2080D	GHC3080D
90	GHC1090D	GHC2090D	GHC3090D
100	GHC1100D	GHC2100D	GHC3100D

##### Type GHB and GHC Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units for HID Lighting Applications

Type	Continuous Ampere Rating at 40°C	277 Vac Maximum Single-Pole Catalog Number
Cable-in	15	GHC1015HID
	20	GHC1020HID
Bolt-on	15	GHB1015HID
	20	GHB1020HID

**Note**  
<sup>①</sup> Use two outside poles.

**Typical F-Frame Breaker**  
F-Frame Breaker with Electronic Trip Unit



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**F-Frame (10–225 Amperes)**

**Product Description**

- All Eaton’s F-Frame circuit breakers are HACR rated
- All circuit breakers 10 through 30 amperes are suitable for HID (high intensity discharge) use
- All F-Frame circuit breakers are suitable for reverse feed use



# 2.3

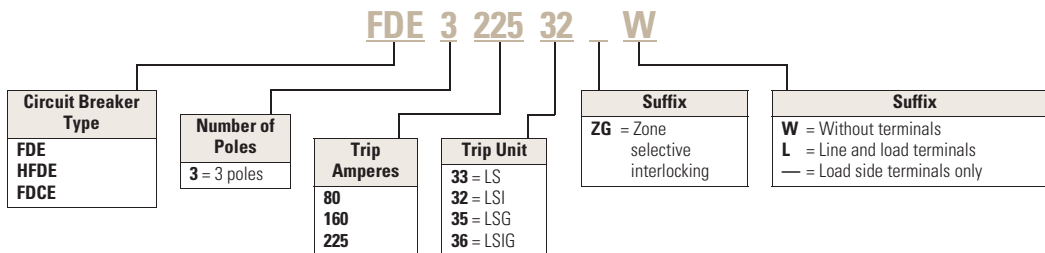
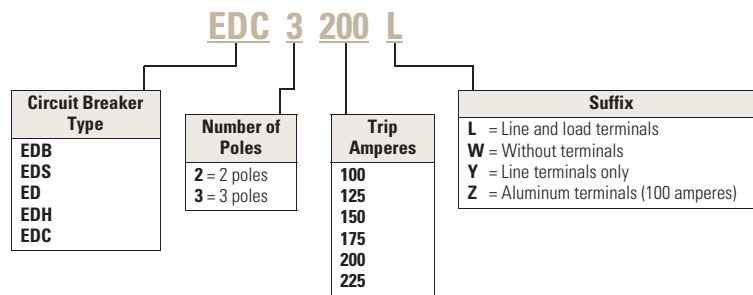
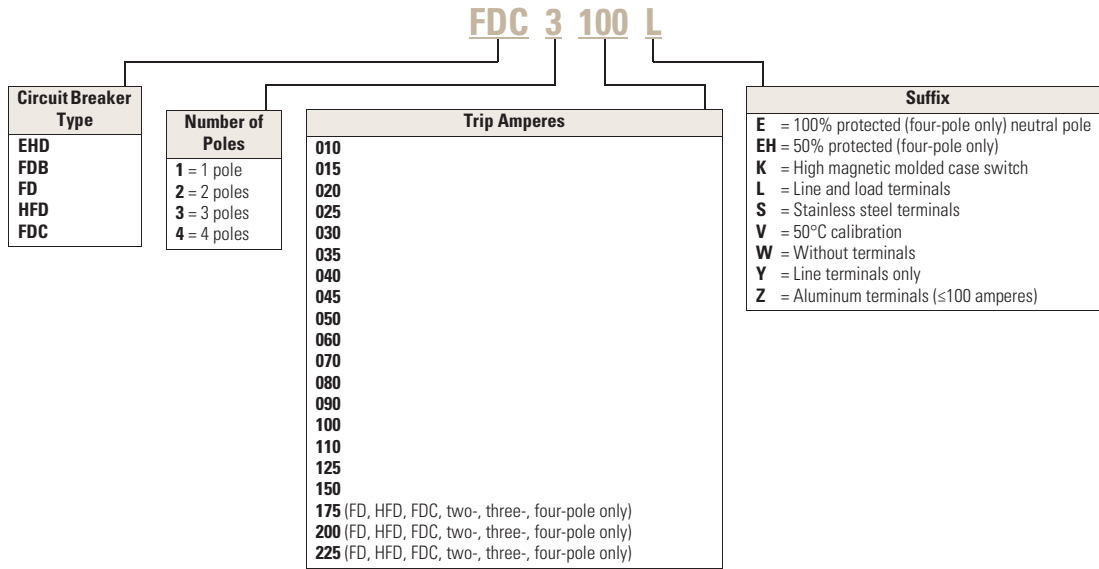
## Molded Case Circuit Breakers

### Series C

#### Catalog Number Selection

This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

2



## Product Selection

## Type ED Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units Suitable for Reverse Feed

2

Maximum Continuous Ampere Rating at 40°C	240 Vac Maximum, 125 Vdc (Includes Terminals on Load End Only) 65 kAIC at 240 Vac	
	Two-Pole Catalog Number	Three-Pole Catalog Number
15	ED2015	ED3015
20	ED2020	ED3020
25	ED2025	ED3025
30	ED2030	ED3030
35	ED2035	ED3035
40	ED2040	ED3040
50	ED2050	ED3050
60	ED2060	ED3060
100	ED2100	ED3100
125	ED2125	ED3125
150	ED2150	ED3150
175	ED2175	ED3175
200	ED2200	ED3200
225	ED2225	ED3225

## Type EDH Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units Suitable for Reverse Feed

Maximum Continuous Ampere Rating at 40°C	240 Vac Maximum, 125 Vdc (Includes Terminals on Load End Only) 100 kAIC at 240 Vac	
	Two-Pole Catalog Number	Three-Pole Catalog Number
15	—	—
20	—	—
25	—	—
30	—	—
35	—	—
40	—	—
50	—	—
60	—	—
100	EDH2100	EDH3100
125	EDH2125	EDH3125
150	EDH2150	EDH3150
175	EDH2175	EDH3175
200	EDH2200	EDH3200
225	EDH2225	EDH3225

### Type EDC Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units Suitable for Reverse Feed

Maximum Continuous Ampere Rating at 40°C	240 Vac Maximum, 125 Vdc (Includes Terminals on Load End Only) 200 kAIC at 240 Vac	
	Two-Pole Catalog Number	Three-Pole Catalog Number
15	—	—
20	—	—
25	—	—
30	—	—
35	—	—
40	—	—
50	—	—
60	—	—
100	EDC2100	EDC3100
125	EDC2125	EDC3125
150	EDC2150	EDC3150
175	EDC2175	EDC3175
200	EDC2200	EDC3200
225	EDC2225	EDC3225

### Type EDB Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units Suitable for Reverse Feed

Maximum Continuous Ampere Rating at 40°C	240 Vac Maximum, 125 Vdc (Includes Terminals on Load End Only) 22 kAIC at 240 Vac	
	Two-Pole Catalog Number	Three-Pole Catalog Number
100	EDB2100	EDB3100
110	EDB2110	EDB3110
125	EDB2125	EDB3125
150	EDB2150	EDB3150
175	EDB2175	EDB3175
200	EDB2200	EDB3200
225	EDB2225	EDB3225

### Type EDS Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units Suitable for Reverse Feed

Maximum Continuous Ampere Rating at 40°C	240 Vac Maximum, 125 Vdc (Includes Terminals on Load End Only) 42 kAIC at 240 Vac	
	Two-Pole Catalog Number	Three-Pole Catalog Number
100	EDS2100	EDS3100
110	EDS2110	EDS3110
125	EDS2125	EDS3125
150	EDS2150	EDS3150
175	EDS2175	EDS3175
200	EDS2200	EDS3200
225	EDS2225	EDS3225

### Type EHD Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units (Includes Terminals on Load End Only)

Maximum Continuous Ampere Rating at 40°C	277 Vac Maximum, 125 Vdc 14 kAIC at 277 Vac Single-Pole	480 Vac Maximum, 250 Vdc 14 kAIC at 480 Vac Two-Pole	Three-Pole
	Catalog Number	Catalog Number	Catalog Number
10 ①	EHD1010	EHD2010	EHD3010
15	EHD1015 ②	EHD2015	EHD3015
20	EHD1020 ②	EHD2020	EHD3020
25	EHD1025	EHD2025	EHD3025
30	EHD1030	EHD2030	EHD3030
35	EHD1035	EHD2035	EHD3035
40	EHD1040	EHD2040	EHD3040
45	EHD1045	EHD2045	EHD3045
50	EHD1050	EHD2050	EHD3050
60	EHD1060	EHD2060	EHD3060
70	EHD1070	EHD2070	EHD3070
80	EHD1080	EHD2080	EHD3080
90	EHD1090	EHD2090	EHD3090
100	EHD1100	EHD2100	EHD3100

#### Notes

① Not UL listed. 5 kAIC interrupting rating.

② UL listed for SWD applications, see NEC Article 240.83(d).

### Type FDB Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units (Includes Terminals on Load End Only)

2

Maximum Continuous Ampere Rating at 40°C	600 Vac Maximum, 250 Vdc 14 kAIC at 600 Vac		
	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
10 ①	FDB2010	FDB3010	FDB4010
15	FDB2015	FDB3015	FDB4015
20	FDB2020	FDB3020	FDB4020
25	FDB2025	FDB3025	FDB4025
30	FDB2030	FDB3030	FDB4030
35	FDB2035	FDB3035	FDB4035
40	FDB2040	FDB3040	FDB4040
45	FDB2045	FDB3045	FDB4045
50	FDB2050	FDB3050	FDB4050
60	FDB2060	FDB3060	FDB4060
70	FDB2070	FDB3070	FDB4070
80	FDB2080	FDB3080	FDB4080
90	FDB2090	FDB3090	FDB4090
100	FDB2100	FDB3100	FDB4100
110	FDB2110	FDB3110	FDB4110
125	FDB2125	FDB3125	FDB4125
150	FDB2150	FDB3150	FDB4150

#### Notes

① Not UL listed. 5 kAIC interrupting rating.

② UL listed for SWD applications, see NEC Article 240.83(d).

**Type FD Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units  
(Includes Terminals on Load End Only)**

Maximum Continuous Ampere Rating at 40°C	277 Vac Maximum, 125 Vdc 35 kAIC at 277 Vac Single-Pole	600 Vac Maximum, 250 Vdc 35 kAIC at 480 Vac		
	Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
10 ①	FD1010	—	—	—
15	FD1015 ②	FD2015	FD3015	FD4015
20	FD1020 ②	FD2020	FD3020	FD4020
25	FD1025	FD2025	FD3025	FD4025
30	FD1030	FD2030	FD3030	FD4030
35	FD1035	FD2035	FD3035	FD4035
40	FD1040	FD2040	FD3040	FD4040
45	FD1045	FD2045	FD3045	FD4045
50	FD1050	FD2050	FD3050	FD4050
60	FD1060	FD2060	FD3060	FD4060
70	FD1070	FD2070	FD3070	FD4070
80	FD1080	FD2080	FD3080	FD4080
90	FD1090	FD2090	FD3090	FD4090
100	FD1100	FD2100	FD3100	FD4100
110	FD1110	FD2110	FD3110	FD4110
125	FD1125	FD2125	FD3125	FD4125
150	FD1150	FD2150	FD3150	FD4150
175	—	FD2175	FD3175	FD4175
200	—	FD2200	FD3200	FD4200
225	—	FD2225	FD3225	FD4225

**Notes**

① Not UL listed. 5 kAIC interrupting rating.

② UL listed for SWD applications, see NEC Article 240.83(d).

# 2.3

## Molded Case Circuit Breakers

### Series C

2

#### Type HFD Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units (Includes Terminals on Load End Only)

Maximum Continuous Ampere Rating at 40°C	277 Vac Maximum, 125 Vdc 65 kAIC at 277 Vac Single-Pole	600 Vac Maximum, 250 Vdc 65 kAIC at 480 Vac		
	Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
15	HFD1015 ①	HFD2015	HFD3015	HFD4015
20	HFD1020 ①	HFD2020	HFD3020	HFD4020
25	HFD1025	HFD2025	HFD3025	HFD4025
30	HFD1030	HFD2030	HFD3030	HFD4030
35	HFD1035	HFD2035	HFD3035	HFD4035
40	HFD1040	HFD2040	HFD3040	HFD4040
45	HFD1045	HFD2045	HFD3045	HFD4045
50	HFD1050	HFD2050	HFD3050	HFD4050
60	HFD1060	HFD2060	HFD3060	HFD4060
70	HFD1070	HFD2070	HFD3070	HFD4070
80	HFD1080	HFD2080	HFD3080	HFD4080
90	HFD1090	HFD2090	HFD3090	HFD4090
100	HFD1100	HFD2100	HFD3100	HFD4100
110	HFD1110	HFD2110	HFD3110	HFD4110
125	HFD1125	HFD2125	HFD3125	HFD4125
150	HFD1150	HFD2150	HFD3150	HFD4150
175	—	HFD2175	HFD3175	HFD4175
200	—	HFD2200	HFD3200	HFD4200
225	—	HFD2225	HFD3225	HFD4225

**Note**

① UL listed for SWD applications, see NEC Article 240.83(d).

**Type FDC Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units  
(Includes Terminals on Load End Only)**

Maximum Continuous Ampere Rating at 40°C	600 Vac Maximum, 250 Vdc 100 kAIC at 480 Vac		
	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
15	FDC2015	FDC3015	FDC4015
20	FDC2020	FDC3020	FDC4020
25	FDC2025	FDC3025	FDC4025
30	FDC2030	FDC3030	FDC4030
35	FDC2035	FDC3035	FDC4035
40	FDC2040	FDC3040	FDC4040
45	FDC2045	FDC3045	FDC4045
50	FDC2050	FDC3050	FDC4050
60	FDC2060	FDC3060	FDC4060
70	FDC2070	FDC3070	FDC4070
80	FDC2080	FDC3080	FDC4080
90	FDC2090	FDC3090	FDC4090
100	FDC2100	FDC3100	FDC4100
110	FDC2110	FDC3110	FDC4110
125	FDC2125	FDC3125	FDC4125
150	FDC215	FDC3150	FDC4150
175	FDC2175	FDC3175	FDC4175
200	FDC2200	FDC3200	FDC4200
225	FDC2225	FDC3225	FDC4225



#### Types FDE, HFDE and FDCE Electronic Circuit Breakers with Non-Interchangeable Trip Units

Maximum Ampere Rating	Neutral CT for LSG and LSIG	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number
<b>IC Rating 35 kAIC at 480 Vac</b>					
80	CTF080	FDE308033	FDE308032	FDE308035	FDE308036
160	CTF160	FDE316033	FDE316032	FDE316035	FDE316036
225	CTF225	FDE322533	FDE322532	FDE322535	FDE322536
<b>IC Rating 65 kAIC at 480 Vac</b>					
80	CTF080	HFDE308033	HFDE308032	HFDE308035	HFDE308036
160	CTF160	HFDE316033	HFDE316032	HFDE316035	HFDE316036
225	CTF225	HFDE322533	HFDE322532	HFDE322535	HFDE322536
<b>IC Rating 100 kAIC at 480 Vac <sup>①</sup></b>					
80	CTF080	FDCE308033	FDCE308032	FDCE308035	FDCE308036
160	CTF160	FDCE316033	FDCE316032	FDCE316035	FDCE316036
225	CTF225	FDCE322533	FDCE322532	FDCE322535	FDCE322536

#### FDE Electronic Breaker with Zone Selective Interlocking

Ampere Rating	LSI w/ZSI Catalog Number	LSIG w/ZSI Catalog Number
<b>35 kAIC at 480 Vac</b>		
80	FDE308032ZG	FDE308036ZG
160	FDE316032ZG	FDE316036ZG
225	FDE322532ZG	FDE322536ZG
<b>65 kAIC at 480 Vac</b>		
80	HFDE308032ZG	HFDE308036ZG
160	HFDE316032ZG	HFDE316036ZG
225	HFDE322532ZG	HFDE322536ZG

#### Digitrip Electronic Trip Units

Circuit Breaker Type	Frame	Ratings
FDE, HFDE, FDCE	225	100, 110, 125, 150, 160, 175, 200, 225
FDE, HFDE, FDCE	160	60, 70, 80, 90, 100, 125, 150, 160
FDE, HFDE, FDCE	80	15, 20, 30, 40, 50, 60, 70, 80

**Note**

<sup>①</sup> Check with Eaton for availability.

**Molded Case Switches**

Eaton's molded case switches are used as compact switches in applications requiring high current switching capabilities. Molded case switches are constructed of circuit breaker

components and are of the high instantaneous automatic type. Molded case switches are listed in accordance with Underwriters Laboratories Standard UL 489.

**Molded Case Switches**

Maximum Continuous Ampere Rating at 40°C	Complete Circuit Breaker with Load Side Terminals Only		
	480 Vac Maximum, 250 Vdc Catalog Number	600 Vac Maximum, 250 Vdc Catalog Number	
<b>Two-Pole</b>			
100	EHD2100K	FD2100K	HFD2100K
150	—	FD2150K	HFD2150K
225	—	FD2225K	HFD2225K
<b>Three-Pole</b>			
100	EHD3100K	FD3100K	HFD3100K
150	—	FD3150K	HFD3150K
225	—	FD3225K	HFD3225K
<b>Four-Pole</b>			
100	—	FD4100K	HFD4100K
150	—	FD4150K	HFD4150K
225	—	FD4225K	HFD4225K

**Note**

Molded case switches will open above 1800 amperes.

## Accessories Selection Guide and Ordering Information

2

Breaker Mount Ammeter <sup>①</sup>

Description	Catalog Number
Breaker mount ammeter	DIGIVIEW

**Line and Load Terminals**

Line and load terminals provide wire connecting capabilities for specific ranges of continuous current ratings and wire types. Except as noted, terminals comply with Underwriters Laboratories Standards UL 486A and UL 486B. Unless otherwise specified, F-Frame circuit breakers are factory equipped with load terminals only.

**Ordering Information**

F-Frame circuit breakers and molded case switches have load terminals only as standard equipment. When standard line-end terminals (same as standard load-end terminals) are required, add Suffix **L** to the circuit breaker catalog number. When non-standard or optional line and/or load terminals are required, order by style number. Specify if factory installation is required.

## Line and Load Terminals

Maximum Breaker Amperes	Terminal Body Material	Wire Type	AWG Wire Range	Metric Wire Range mm <sup>2</sup>	Package of Three Terminals Catalog Number
<b>Standard Pressure Type Terminals</b>					
20 (EHD)	Steel	Cu/Al	14–10	2.5–4	<b>3T20FB</b> <sup>②</sup>
100	Steel	Cu/Al	14–1/0	2.5–50	<b>3T100FB</b>
225	Aluminum	Cu/Al	4–4/0	25–95	<b>3TA225FD</b>
<b>Optional Pressure Terminals</b>					
50	Aluminum	Cu/Al	14–4	2.5–25	<b>3TA50FB</b> <sup>②</sup>
100	Aluminum	Cu/Al	14–1/0	2.5–50	<b>3TA100FD</b>
200	Stainless steel	Cu	4–4/0	25–95	<b>3T150FB</b>
225	Copper	Cu	4–4/0	25–95	<b>3T225FD</b>
225	Aluminum	Cu/Al	6–300 kcmil	16–150	<b>3TA225FDK</b> <sup>③</sup>

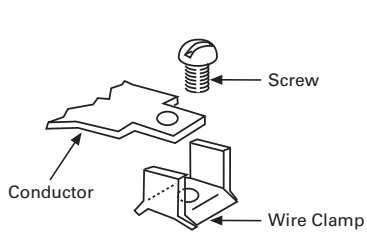
**Notes**

<sup>①</sup> Use on FDE, HFDE and FDCE electronic trip only.

<sup>②</sup> Not for use with ED, EDH, EDC breakers.

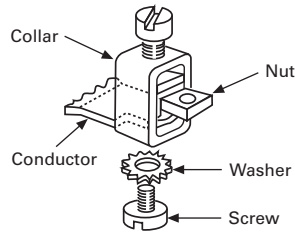
<sup>③</sup> Includes terminal shield kit. Adds approximately 3 inches (76.2) to breaker height. Available for use on three-pole breaker only.

### Line and Load Terminals



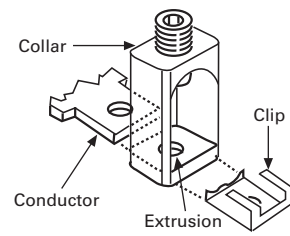
**3T20FB**

Assemble wire clamp to bottom of conductor as shown.



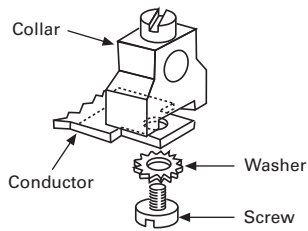
**3T100FB, 3T150FB**

Insert collar enclosing conductor as shown. Locate nut on top of conductor and tighten securely with screw and washer.  
**Caution:** Collar must surround conductor.



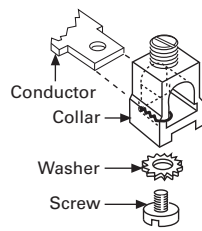
**3TA225FD**

Insert collar enclosing conductor and center on extrusion on collar. Install clip with legs on top of conductor and snap end around bottom of collar.



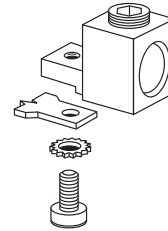
**3TA50FB**

Assemble collar on top of conductor as shown. Tighten securely with screw and washer.



**3TA100FD**

Collar slides onto conductor and is held in position by a screw and lockwasher.



**3TA225FDK (Up to 150 mm<sup>2</sup>)**

Assemble collar on top of conductor as shown. Tighten securely with screw and washer. Terminal shield must be used with this collar.

**Note:** For 185 mm<sup>2</sup>, use 3TA225FDK1.

# 2.3

## Molded Case Circuit Breakers

### Series C

2

#### Accessories

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

#### Allowable Accessory Combinations

##### FD Frame Accessories

Description	Reference Page	Single-Pole		Two-Pole		Three-Pole <sup>①</sup>			Four-Pole			Neutral
		Center		Left	Right	Left	Center	Right	Left	Center	Right	
<b>Internal Accessories (Only one internal accessory per pole)</b>												
Alarm lockout switch (make only)	V4-T2-270	■										
Alarm lockout (Make/Break)	V4-T2-270			■	□	□		■				
Alarm lockout (2Make/2Break)	V4-T2-270			■	□	□		■				
Auxiliary switch (1A, 1B)	V4-T2-272			■	■	■		■	■			■
Auxiliary switch (2A, 2B)	V4-T2-272			■	■	■		■	■			■
Auxiliary switch and alarm switch combination	V4-T2-274			■	□	□		■				
Shunt trip—standard	V4-T2-276			■	■	■		■	■			■
Shunt trip—low energy	V4-T2-280			■	■	■		■	■			
Undervoltage release mechanism	V4-T2-282			■	■	■		■	■			
<b>External Accessories</b>												
End cap kit	V4-T2-303			●	●	●	●	●	●	●	●	●
Keeper nut	V4-T2-303	●		●	●	●	●	●	●	●	●	●
Control wire terminal kit	V4-T2-304	●		●	●	●	●	●	●	●	●	●
Multewire connectors	V4-T2-305	●		●	●	●	●	●	●	●	●	●
Base mounting hardware	V4-T2-305	●		●	●	●	●	●	●	●	●	●
Terminal shields	V4-T2-307	●		●	●	●	●	●	●	●	●	●
Terminal end covers	V4-T2-308					●	●	●				
Interphase barriers	V4-T2-308			●	●	●	●	●	●	●	●	●
Non-padlockable handle block	V4-T2-309	■		■				■		■		
Snap-on padlockable handle lock hasp	V4-T2-309	■		■				■		■		
Padlockable handle lock hasp	V4-T2-310			■	□	□		□	□		□	
Cylinder lock	V4-T2-310					■						
Key interlock kit	V4-T2-311			■	□	□		□	□		□	
Sliding bar interlock—requires two breakers	V4-T2-312					●	●	●				
Walking beam interlock—requires two breakers	V4-T2-312					●	●	●	●	●	●	●
Electrical (solenoid and motor) operators	V4-T2-313					●	●	●	●	●	●	●
Plug-in adapters	V4-T2-314			●	●	●	●	●	●	●	●	●
Rear connecting studs	V4-T2-316	●		●	●	●	●	●	●	●	●	●
Panelboard connecting straps	V4-T2-317	●		●	●	●	●	●	●	●	●	●
Handle mechanisms	V4-T2-419					●	●	●				
LFD current limiter	V4-T2-319					●	●	●				
IQ Energy Sentinel	V4-T2-319			●	●	●	●	●				
Cause of trip display	V4-T2-320					●			●			
Remote mount cause of trip display	V4-T2-320					●			●			
Cause of trip LED	V4-T2-320					●			●			
<b>Modifications (Refer to Eaton)</b>												
Special calibration	—	●		●	●	●	●	●	●	●	●	●
Moisture fungus treatment	V4-T2-110	●		●	●	●	●	●	●	●	●	●
Freeze-tested circuit breakers	—	●		●	●	●	●	●	●	●	●	●
Marine/naval application	—	●		●	●	●	●	●	●	●	●	●

#### Legend

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

#### Note

<sup>①</sup> Internal accessories are listed with Underwriters Laboratories (UL) for factory installation. They are not listed with UL for field installation.

## Technical Data and Specifications

### UL 489 Interrupting Capacity Ratings

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)					
		Volts AC (50/60 Hz)				Volts DC <sup>①</sup>	
		240	277	480	600	125	250 <sup>②③</sup>
EDB	2, 3	22	—	—	—	10	—
EDS	2, 3	42	—	—	—	10	—
ED	2, 3	65	—	—	—	10	—
EDH	2, 3	100	—	—	—	10	—
EDC	2, 3	200	—	—	—	10	—
EHD	1	—	4	—	—	10	—
	2, 3	18	—	14	—	—	10
FDB	2, 3, 4	18	—	14	14	—	10
FD	1	—	35	—	—	10	—
	2, 3, 4	65	—	35	18	—	10
FDE <sup>④</sup>	2, 3, 4	65	—	35	18	—	—
HFD	1	—	65	—	—	10	—
	2, 3, 4	100	—	65	25	—	22
HFDE <sup>④</sup>	2, 3, 4	100	—	65	25	—	—
FDC <sup>⑤</sup>	2, 3, 4	200	—	100	35	—	22
FDCE <sup>④⑤⑥</sup>	3	200	—	100	25	—	—

### IEC 157-1 (P1) Interrupting Capacity Ratings (P1)

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)				Volts DC <sup>①</sup>	
		Volts AC (50/60 Hz)		440	500	125	250 <sup>②③</sup>
		220, 240	380, 415	440	500	125	250 <sup>②③</sup>
EDB	2, 3	22	—	—	—	10	—
EDS	2, 3	42	—	—	—	10	—
ED	2, 3	65	—	—	—	10	—
EDH	2, 3	100	—	—	—	10	—
EDC	2, 3	200	—	—	—	10	—
EHD	1	—	14	—	—	10	—
	2, 3	18	—	14	—	—	10
FDB	2, 3, 4	18	14	14	14	—	10
FD	1	35	—	—	—	10	—
	2, 3, 4	65	35	35	18	—	10
HFD	1	65	—	—	—	10	—
	2, 3, 4	100	65	65	25	—	22
FDC	2, 3, 4	200	100	100	35	—	22

### Digitrip Electronic Trip Units

Circuit Breaker Type	Frame	Ratings
FDE, HFDE, FDCE	225	100, 110, 125, 150, 160, 175, 200, 225
FDE, HFDE, FDCE	160	60, 70, 80, 90, 100, 125, 150, 160
FDE, HFDE, FDCE	80	15, 20, 30, 40, 50, 60, 70, 80

#### Notes

- ① DC ratings apply to substantially non-inductive circuits.
- ② Two-pole circuit breaker, or two poles of three-pole circuit breaker.
- ③ Time constant is 3 milliseconds minimum at 10 kA and 8 milliseconds minimum at 22 kA.
- ④ Electronics available on three-pole only, no DC rating for FDE, HFDE, FDCE.
- ⑤ Current limiting.
- ⑥ Check with Eaton for availability.

## F-Frame Digitrip Specifications

Trip Unit Type	Digitrip RMS 310+	
rms sensing	Yes	
<b>Breaker Type</b>		
Frame	FDE	
Ampere range	15–225A	
Interrupting rating at 480V	35, 65, 100 (kA)	
<b>Protection</b>		
Ordering options	LS	LSI
	LSG	LSIG
Fixed rated plug ( $I_n$ )	No	
Overtemperature trip	Yes	
<b>Long Delay Protection (L)</b>		
Adjustable rating plug ( $I_n$ )	No	
Long delay pickup	40–100% frame	
Long delay time $I^2t$	2–24 seconds	
Long delay time $I^4t$	No	
Long delay thermal memory	Yes	
High load alarm	Yes	
<b>Short Delay Protection (S)</b>		
Short delay pickup	200–1000% $\times I_r$	
Short delay time $I^2t$	Yes	No
Short delay time Flat	No	Inst–300 ms
Short delay time Z.S.I.	Yes <sup>①</sup>	
<b>Instantaneous Protection (I)</b>		
Instantaneous pickup	No	
Discriminator	No	
Instantaneous override	Yes	
<b>Ground Fault Protection (G)</b>		
Ground fault alarm	No	
Ground fault pickup	20–100% frame	
Ground fault delay $I^2t$	No	
Ground fault delay flat	Inst–300 ms	
Ground fault Z.S.I.	Yes <sup>①</sup>	
Ground fault thermal memory	Yes	
<b>System Diagnostics</b>		
Cause of trip LEDs	No	
Magnitude of trip information	No	
Remote signal contacts	No	
<b>System Monitoring</b>		
Digital display	No	
Current	No	
Voltage	No	
Power and energy	No	
Power quality harmonics	No	
Power factor	No	
<b>Communications</b>		
PowerNet	No	
<b>Testing</b>		
Testing method	Test kit	

**Legend**

$I_n$  = Rating Plug  
 $I_r$  = Long Delay Pickup Setting  $\times I_n$

**Note**

① ZSI (zone selective interlocking) is optional. Must order with ZSI. Standard 310+ does not come with ZSI.

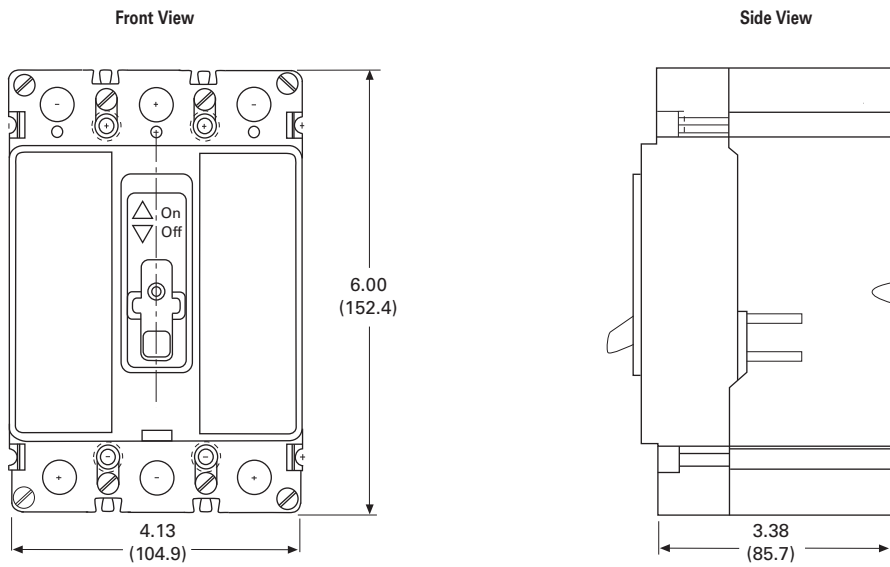
**Dimensions and Weights**

Approximate Dimensions in Inches (mm)

**FD Frame**

Number of Poles	Width	Height	Depth
1	1.38 (35.1)	6.00 (152.4)	3.38 (86.0)
2	2.75 (70.0)	6.00 (152.4)	3.38 (86.0)
3	4.13 (105.0)	6.00 (152.4)	3.38 (86.0)
4	5.50 (139.7)	6.00 (152.4)	3.38 (86.0)

**FD Frame, Three-Pole**



Approximate Shipping Weight Lbs (kg)

**FD Frame**

Breaker Type	Number of Poles			
	1	2	3	4
ED, EDB, EDS, EDH, EDC	—	3 (1.4)	4.5 (2.0)	—
EHD, FDB, FD, HFD, FDC	2 (0.9)	3 (1.4)	4.5 (2.0)	6 (2.7)
FDE, HFDE, FDCE	—	—	4.5 (2.0)	—



Typical J-Frame Breaker

2



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### J-Frame (70–250 Amperes)

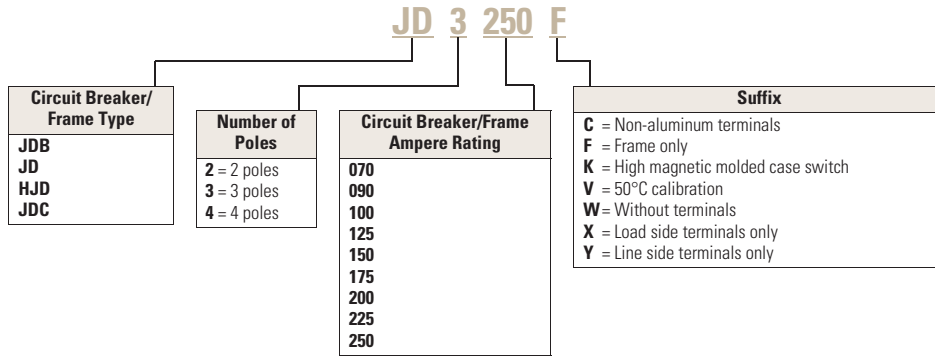
#### Product Description

- All Eaton's J-Frame circuit breakers are HACR rated
- J-Frame circuit breakers are available as individual components (frame, trip unit, terminals), or factory assembled complete breakers
- J-Frame circuit breakers with non-interchangeable trip units are suitable for reverse feed use

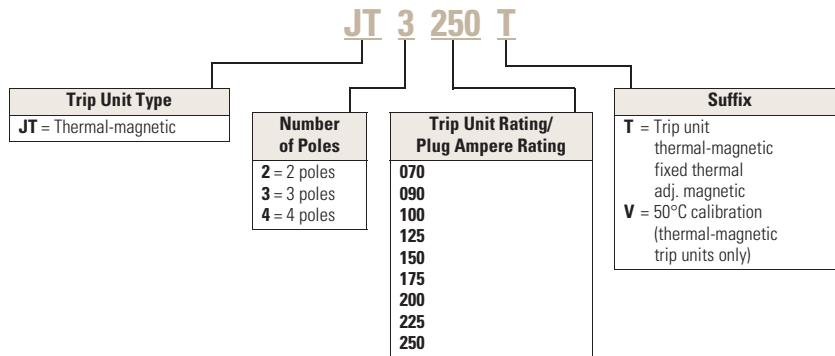
## Catalog Number Selection

This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

### Circuit Breaker/Frame



### Trip Unit



## Product Selection

## 2

## Types JD, HJD and JDC Thermal-Magnetic Circuit Breakers with Interchangeable Trip Units

Maximum Continuous Ampere Rating at 40°C	Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals ①	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals ①	Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals ①	Thermal-Magnetic Trip Unit Only ①	Standard Terminals Only
	Catalog Number	Catalog Number	Catalog Number	For Use with Standard or High or Ultra High Interrupting Frames Catalog Number	See Page V4-T2-150 for Optional Terminals Catalog Number
<b>Two-Pole</b>					
70	JD2070	HJD2070	JDC2070	JT2070T	TA250KB ②
90	JD2090	HJD2090	JDC2090	JT2090T	
100	JD2100	HJD2100	JDC2100	JT2100T	
125	JD2125	HJD2125	JDC2125	JT2125T	
150	JD2150	HJD2150	JDC2150	JT2150T	
175	JD2175	HJD2175	JDC2175	JT2175T	
200	JD2200	HJD2200	JDC2200	JT2200T	
225	JD2225	HJD2225	JDC2225	JT2225T	
250	JD2250	HJD2250	JDC2250	JT2250T	
<b>Three-Pole</b>					
70	JD3070	HJD3070	JDC3070	JT3070T	TA250KB ②
90	JD3090	HJD3090	JDC3090	JT3090T	
100	JD3100	HJD3100	JDC3100	JT3100T	
125	JD3125	HJD3125	JDC3125	JT3125T	
150	JD3150	HJD3150	JDC3150	JT3150T	
175	JD3175	HJD3175	JDC3175	JT3175T	
200	JD3200	HJD3200	JDC3200	JT3200T	
225	JD3225	HJD3225	JDC3225	JT3225T	
250	JD3250	HJD3250	JDC3250	JT3250T	
<b>Four-Pole ③④</b>					
125	JD4125	HJD4125	JDC4125	JT3125T	TA250KB ②
150	JD4150	HJD4150	JDC4150	JT3150T	
175	JD4175	HJD4175	JDC4175	JT3175T	
200	JD4200	HJD4200	JDC4200	JT3200T	
225	JD4225	HJD4225	JDC4225	JT3225T	
250	JD4250	HJD4250	JDC4250	JT3250T	

**Notes**

- ① Magnetic trip adjustable 5–10 times continuous ampere rating.
- ② Individually packed.
- ③ Fully rated neutral pole with no protection.
- ④ Neutral is in right pole.

**Types JD, HJD and JDC Thermal-Magnetic Circuit Breakers—  
Frame Only**

Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac Catalog Number	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac Catalog Number	Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac Catalog Number
<b>Two-Pole</b>		
JD2250F	HJD2250F	JDC2250F
<b>Three-Pole</b>		
JD3250F	HJD3250F	JDC3250F
<b>Four-Pole</b>		
JD4250F	HJD4250F	JDC4250F

**Type JDB Thermal-Magnetic Circuit Breakers with Non-  
Interchangeable Thermal-Magnetic Trip Units Suitable for  
Reverse Feed Application**

Maximum Continuous Ampere Rating at 40°C	600 Vac Rated, 250 Vdc Complete Circuit Breaker	
	Without Line and Load Terminals Catalog Number	With Standard Line and Load Terminals Only Catalog Number
<b>Two-Pole</b>		
70	JDB2070W	JDB2070
90	JDB2090W	JDB2090
100	JDB2100W	JDB2100
125	JDB2125W	JDB2125
150	JDB2150W	JDB2150
175	JDB2175W	JDB2175
200	JDB2200W	JDB2200
225	JDB2225W	JDB2225
250	JDB2250W	JDB2250
<b>Three-Pole</b>		
70	JDB3070W	JDB3070
90	JDB3090W	JDB3090
100	JDB3100W	JDB3100
125	JDB3125W	JDB3125
150	JDB3150W	JDB3150
175	JDB3175W	JDB3175
200	JDB3200W	JDB3200
225	JDB3225W	JDB3225
250	JDB3250W	JDB3250

**Molded Case Switches**

Eaton's molded case switches are used as compact switches in applications requiring high current switching capabilities. Molded case switches are constructed of circuit breaker

components and are of the high instantaneous automatic type. Molded case switches are listed in accordance with Underwriters Laboratories Standard UL 489.

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**Molded Case Switches**

Maximum Continuous Ampere Rating at 40°C	600 Vac Maximum, 250 Vdc Complete Circuit Breaker Only Without Line and Load Terminals		Standard Terminals Only
	Catalog Number	Suitable for Reverse Feed Use Catalog Number	See Page V4-T2-150 for Optional Terminals Catalog Number
<b>Two-Pole</b>			
250	JD2250KW	JDB2250KW	TA250KB ①
	HJD2250KW	HJDB2250KW	—
<b>Three-Pole</b>			
250	JD3250KW	JDB3250KW	TA250KB ①
	HJD3250KW	HJDB3250KW	—
<b>Four-Pole</b>			
250	JD4250KW	JDB4250KW	TA250KB ①
	HJD4250KW	HJDB4250KW	—

**Notes**

① Individually packed.

Molded case switches may open above 2500 amperes.

# 2.3

## Molded Case Circuit Breakers

### Series C

2

#### Accessories Selection Guide and Ordering Information

##### Line and Load Terminals

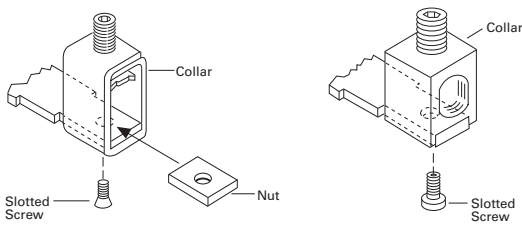
Eaton's line and load terminals provide wire connecting capabilities for specific ranges of continuous current ratings and wire types. All terminals comply with Underwriters Laboratories Standards UL 486A and UL 486B and CSA Standard C22.2 No. 65, or Electrical Bulletin 1165.

Unless otherwise specified, J-Frame circuit breaker line and load terminals are shipped separately for field installation.

The bottom of the standard TA250KB terminal contains a recess that is positioned over the J-Frame circuit breaker terminal conductor.

##### Ordering Information

J-Frame circuit breakers use Cu/Al terminals as standard. When optional copper-only terminals are required, order by catalog number. Specify if factory installation is required.



T250KB Terminal

TA250KB Terminal (Standard)

##### Line and Load Terminals

Maximum Breaker Amperes	Terminal Body Material	Wire Type	AWG Wire Range/ No. Conductors	Metric Wire Range mm <sup>2</sup>	Catalog Number
<b>Standard Cu/Al Pressure Terminals</b>					
250	Aluminum	Cu/Al	4–350 kcmil	25–185	TA250KB
<b>Optional Cu Pressure Terminals</b>					
250	Stainless Steel	Cu	4–350 kcmil	25–185	T250KB

## Accessories

### Allowable Accessory Combinations

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

### JD Frame Accessories

Description	Reference Page	Two-, Three-Pole			Four-Pole			Neutral
		Left	Center	Right	Left	Center	Right	
<b>Internal Accessories (Only One Internal Accessory Per Pole)</b>								
Alarm lockout (Make/Break)	V4-T2-270	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	
Auxiliary switch (1A, 1B)	V4-T2-272	■		■	■		■	
Auxiliary switch (2A, 2B)	V4-T2-272	■		■	■		■	
Auxiliary switch and alarm switch combination	V4-T2-274	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	
Shunt trip—standard	V4-T2-277	■		■	■		■	
Shunt trip—low energy	V4-T2-280	■		■	■		■	
Undervoltage release mechanism	V4-T2-284	■		■	■		■	
<b>External Accessories</b>								
End cap kit	V4-T2-303	●	●	●	●	●	●	●
Plug nut	V4-T2-304	●	●	●	●	●	●	●
Control wire terminal kit	V4-T2-304	●	●	●	●	●	●	●
Multewire connectors	V4-T2-305	●	●	●	●	●	●	●
Base mounting hardware	V4-T2-306	●	●	●	●	●	●	●
Terminal shields	V4-T2-307	●	●	●	●	●	●	●
Interphase barriers	V4-T2-308	●	●	●	●	●	●	●
Non-padlockable handle block	V4-T2-309		■			■		
Padlockable handle block	V4-T2-309		■			■		
Padlockable handle lock hasp	V4-T2-310	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	
Cylinder lock	V4-T2-310	<input type="checkbox"/>		<input type="checkbox"/>				
Key interlock kit	V4-T2-311	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	
Sliding bar interlock—requires two breakers	V4-T2-312	●	●	●				
Electrical (solenoid) operator	V4-T2-314	●	●	●	●	●	●	●
Plug-in adapters	V4-T2-314	●	●	●	●	●	●	●
Rear connecting studs	V4-T2-316	●	●	●	●	●	●	●
Panelboard connecting straps	V4-T2-317	●	●	●	●	●	●	●
Handle mechanisms	V4-T2-419	●	●	●	●	●	●	●
Handle extension	V4-T2-434	●	●	●	●	●	●	●
IQ Energy Sentinel	V4-T2-319	●	●	●				
<b>Modifications (Refer to Eaton)</b>								
Special calibration	—	●	●	●	●	●	●	●
Moisture fungus treatment	V4-T2-110	●	●	●	●	●	●	●
Freeze-tested circuit breakers	—	●	●	●	●	●	●	●
Marine/naval application	—	●	●	●	●	●	●	●

#### Legend

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

## Technical Data and Specifications

2

### UL 489 Interrupting Capacity Ratings

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)				
		Volts AC (50/60 Hz)			Volts DC	
		240	480	600	125	250 <sup>①②</sup>
JDB	2, 3	65	35	18	—	10
JD	2, 3, 4	65	35	18	—	10
HJD	2, 3, 4	100	65	25	—	22
JDC <sup>③</sup>	2, 3, 4	200	100	35	—	22

### IEC 157-1 (P1) Interrupting Capacity Ratings

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)					
		Volts AC (50/60 Hz)			Volts DC		
		240	380	415	600	125	250 <sup>①②</sup>
JD	2, 3, 4	65	35	35	—	—	10
HJD	2, 3, 4	100	65	65	—	—	22
JDC	2, 3, 4	200	100	100	—	—	22

#### Notes

- ① Two-pole circuit breaker or two outside poles of three-pole circuit breaker.
- ② Time constant is 3 milliseconds minimum at 10 kA and 8 milliseconds minimum at 22 kA.
- ③ Current limiting.

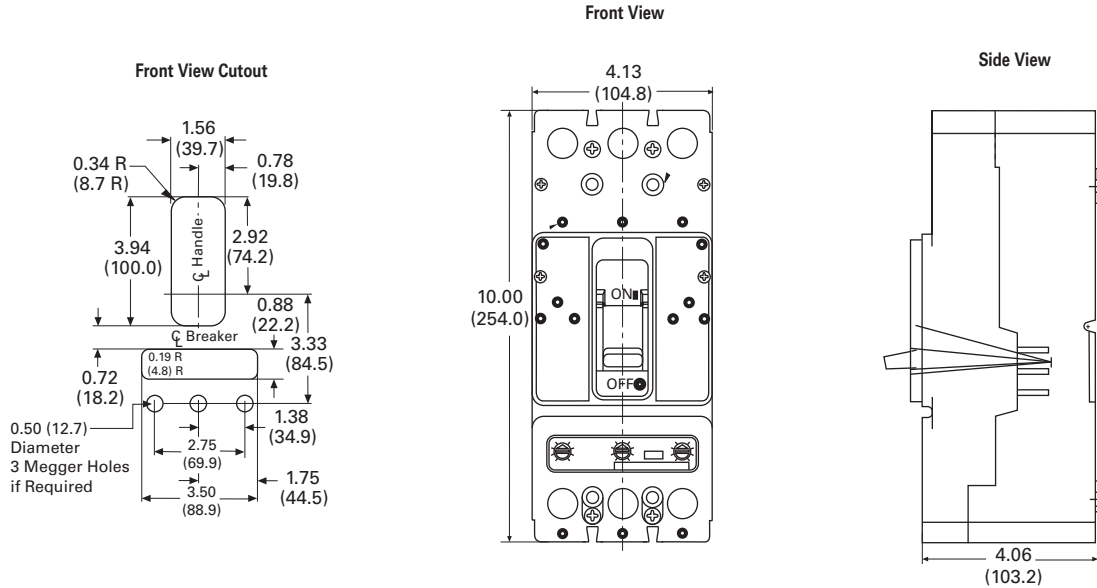
**Dimensions and Weights**

Approximate Dimensions in Inches (mm)

**JD Frame**

Number of Poles	Width	Height	Depth
2, 3	4.13 (105.0)	10.00 (254.0)	4.06 (104.1)
4	5.50 (139.7)	10.00 (254.0)	4.06 (104.1)

**JD-Frame, Three-Pole**



Approximate Shipping Weight in Lbs (kg)

**JD Frame**

Breaker Type	Complete Breaker			Frame Only			Trip Unit		
	Two-Pole	Three-Pole	Four-Pole	Two-Pole	Three-Pole	Four-Pole	Two-Pole	Three-Pole	Four-Pole
JDB	11.25 (5.1)	12.50 (5.7)	—	—	—	—	—	—	—
JD	11.25 (5.1)	12.50 (5.7)	13.25 (6.0)	9.00 (4.1)	10.00 (4.5)	10.50 (4.8)	2.00 (0.9)	2.00 (0.9)	2.25 (1.0)
HJD	11.25 (5.1)	12.50 (5.7)	13.25 (6.0)	9.00 (4.1)	10.00 (4.5)	10.50 (4.8)	2.00 (0.9)	2.00 (0.9)	2.25 (1.0)
JDC	12.25 (5.6)	13.50 (6.1)	14.25 (6.5)	10.00 (4.5)	11.00 (5.0)	11.50 (5.2)	2.00 (0.9)	2.00 (0.9)	2.25 (1.0)



Typical K-Frame Circuit Breaker

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N-Frame (400–1200 Amperes) . . . . .	V4-T2-216
R-Frame (800–2500 Amperes) . . . . .	V4-T2-231
Motor Circuit Protectors (MCP) . . . . .	V4-T2-250
Motor Protection Circuit Breakers (MPCB) . . . . .	V4-T2-261
Type ELC Current Limiter Attachment (Size 0–4) . . . . .	V4-T2-263
Current Limiting Circuit Breaker Module . . . . .	V4-T2-264
Internal Accessories . . . . .	V4-T2-268
External Accessories . . . . .	V4-T2-299

### K-Frame (70–400 Amperes)

#### Product Description

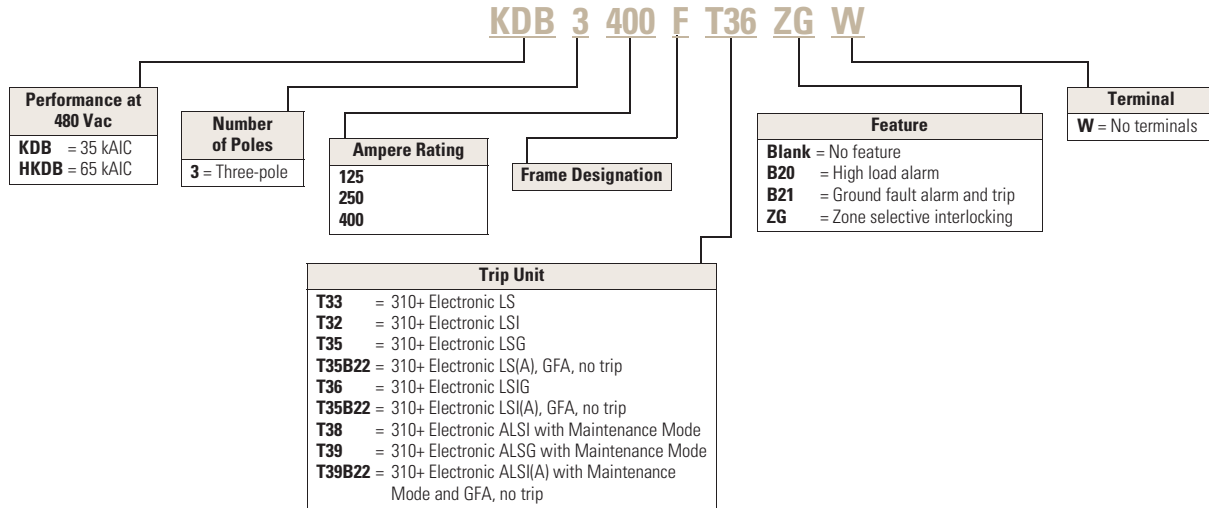
- All Eaton K-Frame circuit breakers are HACR rated
- K-Frame circuit breakers are available as individual components (frame, trip unit, terminals), or factory assembled complete breakers
- K-Frame circuit breakers with non-interchangeable trip units are suitable for reverse feed use

**Catalog Number Selection**

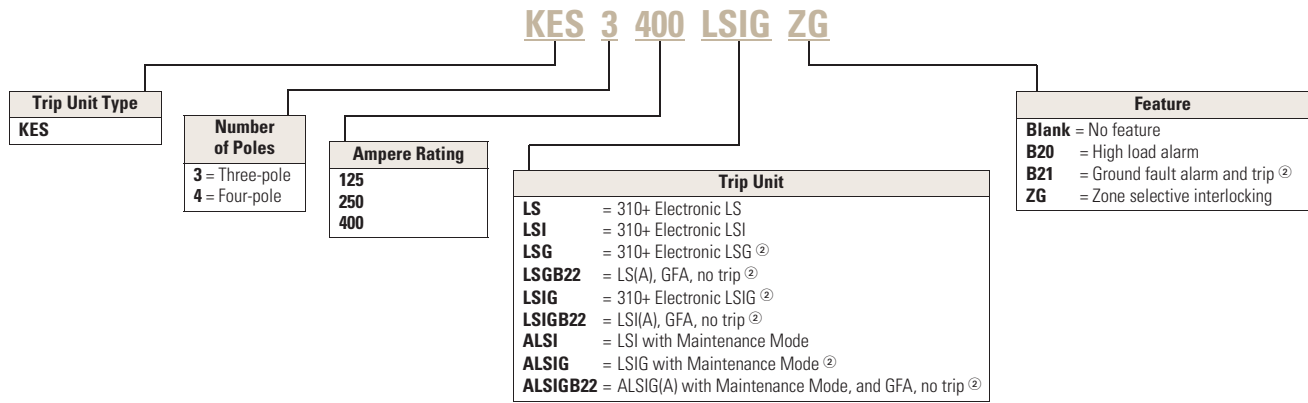
This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

**K-Frame with 310+ Electronic Trip Unit Technology ①**

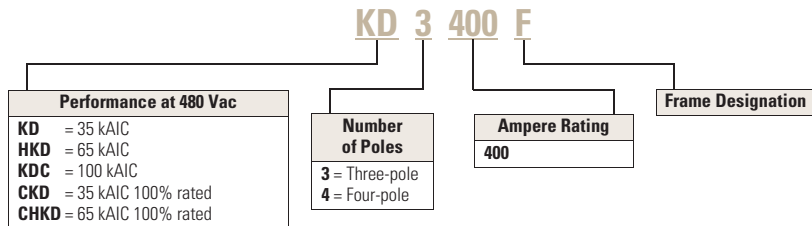
**250/400A K-Frame 310+ Assembly Breaker ②**



**250/400A 310+ Electronic Trip Unit**



**400A Frame Only**



**Note**

- ① Cannot combine 'B2X' suffixes with 'B2X' suffixes.
- ② Not available in four-pole configurations.

# 2.3

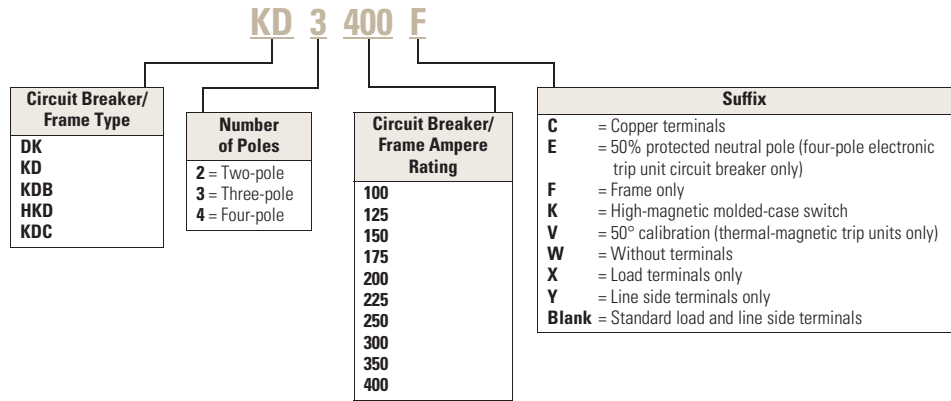
## Molded Case Circuit Breakers

Series C

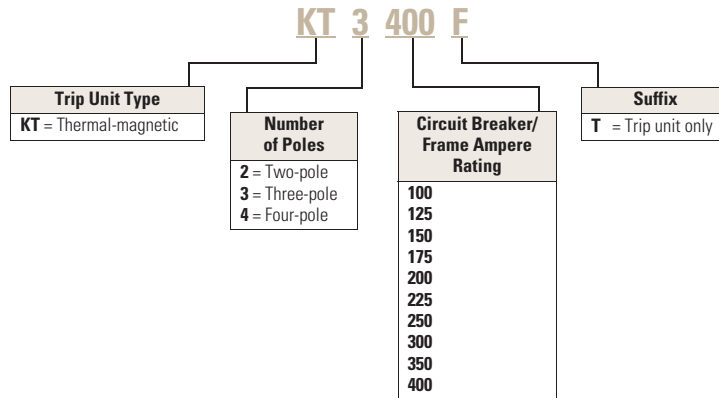
### K-Frame with Thermal-Magnetic Trip Unit Technology

2

#### Thermal-Magnetic Breaker/Frame

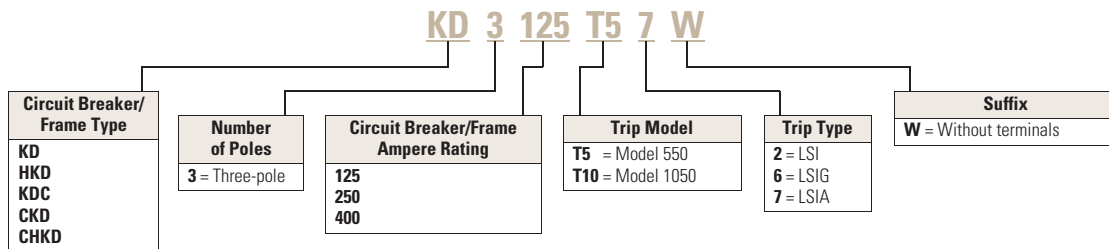


#### Thermal-Magnetic Trip Unit



### K-Frame with OPTIM Trip Unit Technology

#### OPTIM Circuit Breaker/Frame



**Note**

① Ampere rating available with electronic trip unit only.

## Product Selection

## Types KD, HKD and KDC Thermal-Magnetic Circuit Breakers with Interchangeable Trip Units

2

Maximum Continuous Ampere Rating at 40°C	Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals ①	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals ①	Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals ①	Thermal-Magnetic Trip Unit Only ①	Standard Terminals Only
	Catalog Number	Catalog Number	Catalog Number	For Use with Standard or High or Ultra High Interrupting Frames Catalog Number	See Page V4-T2-173 for Optional Terminals Catalog Number
<b>Two-Pole</b>					
100	KD2100	HKD2100	KDC2100	KT2100T	TA300K ②
125	KD2125	HKD2125	KDC2125	KT2125T	TA300K ②
150	KD2150	HKD2150	KDC2150	KT2150T	TA300K ②
175	KD2175	HKD2175	KDC2175	KT2175T	TA300K ②
200	KD2200	HKD2200	KDC2200	KT2200T	TA300K ②
225	KD2225	HKD2225	KDC2225	KT2225T	TA300K ②
250	KD2250	HKD2250	KDC2250	KT2250T	TA350K ②
300	KD2300	HKD2300	KDC2300	KT2300T	TA350K ②
350	KD2350	HKD2350	KDC2350	KT2350T	TA350K ②
400	KD2400	HKD2400	KDC2400	KT2400T	2TA400K ③
<b>Three-Pole</b>					
100	KD3100	HKD3100	KDC3100	KT3100T	TA300K ②
125	KD3125	HKD3125	KDC3125	KT3125T	TA300K ②
150	KD3150	HKD3150	KDC3150	KT3150T	TA300K ②
175	KD3175	HKD3175	KDC3175	KT3175T	TA300K ②
200	KD3200	HKD3200	KDC3200	KT3200T	TA300K ②
225	KD3225	HKD3225	KDC3225	KT3225T	TA300K ②
250	KD3250	HKD3250	KDC3250	KT3250T	TA350K ②
300	KD3300	HKD3300	KDC3300	KT3300T	TA350K ②
350	KD3350	HKD3350	KDC3350	KT3350T	TA350K ②
400	KD3400	HKD3400	KDC3400	KT3400T	3TA400K ③
<b>Four-Pole</b>					
100	KD4100	HKD4100	KDC4100	KT3100T	TA300K ②
125	KD4125	HKD4125	KDC4125	KT3125T	TA300K ②
175	KD4175	HKD4175	KDC4175	KT3175T	TA300K ②
200	KD4200	HKD4200	KDC4200	KT3200T	TA300K ②
225	KD4225	HKD4225	KDC4225	KT3225T	TA300K ②
250	KD4250	HKD4250	KDC4250	KT3250T	TA350K ②
300	KD4300	HKD4300	KDC4300	KT3300T	TA350K ②
350	KD4350	HKD4350	KDC4350	KT3350T	TA350K ②
400	KD4400	HKD4400	KDC4400	KT3400T	4TA400K ③

## Notes

- ① Magnetic trip adjustable 5–10 times continuous ampere rating.  
 ② Individually packed.  
 ③ 2TA400K, 3TA400K and 4TA400K terminal kits contain one terminal for each pole and one terminal cover.

# 2.3

## Molded Case Circuit Breakers

### Series C

2

#### Types KD, HKD and KDC Thermal-Magnetic Circuit Breakers—Frame Only

Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac Catalog Number	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac Catalog Number	Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac Catalog Number
<b>Two-Pole</b>		
KD2400F	HKD2400F	KDC2400F
<b>Three-Pole</b>		
KD3400F	HKD3400F	KDC3400F
<b>Four-Pole</b>		
KD4400F	HKD4400F	KDC4400F

#### Types KD, HKD and KDC Electronic Circuit Breakers with Interchangeable 310+ Trip Units

Order as individual components: breaker frame, trip unit and terminals. See 310+ adjustability specifications on **Page V4-T2-176**.

#### Types KD, HKD and KDC Electronic Circuit Breakers with Interchangeable 310+ Trip Units—Three-Pole ①

Max. Cont. Ampere Rating at 40°C	Circuit Breaker Frame Only			Digitrip RMS 310+ Trip Unit Only ②		Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay and Ground Fault Protection	Independently Adjustable Short Time Pickup and Delay and Ground Fault Protection	Terminal Information
	Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac Catalog Number	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac	Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac	Standard	Options			
125	KD3400F	HKD3400F	KDC3400F	KES3125LS	KES3125LSI	KES3125LSG	KES3125LSIG	See Page V4-T2-173
250	KD3400F	HKD3400F	KDC3400F	KES3250LS	KES3250LSI	KES3250LSG	KES3250LSIG	
400	KD3400F	HKD3400F	KDC3400F	KES3400LS	KES3400LSI	KES3400LSG	KES3400LSIG	

#### Types KD, HKD and KDC Electronic Circuit Breakers with Interchangeable 310+ Trip Units—Four-Pole ③④

Max. Cont. Ampere Rating at 40°C	Circuit Breaker Frame Only			Digitrip RMS 310+ Trip Unit Only ②		Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay and Ground Fault Protection	Independently Adjustable Short Time Pickup and Delay and Ground Fault Protection	Terminal Information
	Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac Catalog Number	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac	Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac	Standard	Options			
125	KD4400F	HKD4400F	KDC4400F	KES4125LS	KES4125LSI	—	—	See Page V4-T2-173
250	KD4400F	HKD4400F	KDC4400F	KES4250LS	KES4250LSI	—	—	
400	KD4400F	HKD4400F	KDC4400F	KES4400LS	KES4400LSI	—	—	

#### Notes

- ① Three-pole KES trip units are for use in three-pole frames only.
- ② For AC use only.
- ③ Trip unit includes protected neutral pole. Use corresponding three-pole trip unit if protected neutral pole is not required.
- ④ Fully rated neutral pole protection is standard. For 50% rated protection on neutral pole, add Suffix **E** to four-pole trip unit catalog number.

**Type KDB with Digitrip 310+ Non-Interchangeable Trip Unit Suitable for Reverse Feed**

See 310+ adjustability specifications on **Page V4-T2-176**.

		Circuit Breaker Frame Including Digitrip RMS 310+ Electronic Trip Unit Less Terminals—Catalog Number			
		L – Adjustable Long Delay Pickup (By Adjustable Rating Plug) S – Adjustable Short Delay Pickup with Fixed Short Delay Time (I <sup>2</sup> t Response) or Adjustable Short Time (Flat Response) I – Adjustable Instantaneous Pickup by Setting Short Time Delay Time to Instantaneous G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Delay (Flat Response)			
Maximum Continuous Ampere Rating at 40°C		LS	LSI	LSG	LSIG
Short Time Range		2–8 x I <sub>n</sub>	2–8 x I <sub>n</sub>	2–8 x I <sub>n</sub>	2–8 x I <sub>n</sub>
Short Time Delay		—	1–300 ms	—	0–300 ms
Ground Fault Pickup	Number of Poles	—	—	Varies by frame	Varies by frame
Ground Fault Delay		—	—	0–500 ms	0–500 ms
125	3	KDB3125FT33W	KDB3125FT32W	KDB3125FT35W	KDB3125FT36W
250	3	KDB3250FT33W	KDB3250FT32W	KDB3250FT35W	KDB3250FT36W
400	3	KDB3400FT33W	KDB3400FT32W	KDB3400FT35W	KDB3400FT36W

**Type HKDB with Digitrip 310+ Non-Interchangeable Trip Unit Suitable for Reverse Feed**

See 310+ adjustability specifications on **Page V4-T2-176**.

		Circuit Breaker Frame Including Digitrip RMS 310+ Electronic Trip Unit Less Terminals—Catalog Number			
		L – Adjustable Long Delay Pickup (By Adjustable Rating Plug) S – Adjustable Short Delay Pickup with Fixed Short Delay Time (I <sup>2</sup> t Response) or Adjustable Short Time (Flat Response) I – Adjustable Instantaneous Pickup by Setting Short Time Delay Time to Instantaneous G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Delay (Flat Response)			
Maximum Continuous Ampere Rating at 40°C		LS	LSI	LSG	LSIG
Short Time Range		2–8 x I <sub>n</sub>	2–8 x I <sub>n</sub>	2–8 x I <sub>n</sub>	2–8 x I <sub>n</sub>
Short Time Delay		—	1–300 ms	—	0–300 ms
Ground Fault Pickup	Number of Poles	—	—	Varies by frame	Varies by frame
Ground Fault Delay		—	—	0–500 ms	0–500 ms
125	3	HKDB3125FT33W	HKDB3125FT32W	HKDB3125FT35W	HKDB3125FT36W
250	3	HKDB3250FT33W	HKDB3250FT32W	HKDB3250FT35W	HKDB3250FT36W
400	3	HKDB3400FT33W	HKDB3400FT32W	HKDB3400FT35W	HKDB3400FT36W

# 2.3

## Molded Case Circuit Breakers

### Series C

#### Types DK and KDB Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units

Suitable for reverse feed application.

2

#### Types DK and KDB Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units

Maximum Continuous Ampere Rating at 40°C	240 Vac Rated, 250 Vdc Complete Circuit Breaker			600 Vac Rated, 250 Vdc Complete Circuit Breaker	
	Without Line and Load Terminals Catalog Number	With Line Terminals Only Catalog Number	With Standard Line and Load Terminals Only Catalog Number	Without Line and Load Terminals Catalog Number	With Standard Line and Load Terminals Catalog Number
<b>Two-Pole</b>					
100	—	—	—	KDB2100W	KDB2100
125	—	—	—	KDB2125W	KDB2125
150	—	—	—	KDB2150W	KDB2150
175	—	—	—	KDB2175W	KDB2175
200	—	—	—	KDB2200W	KDB2200
225	—	—	—	KDB2225W	KDB2225
250	DK2250W	DK2250Y	DK2250	KDB2250W	KDB2250
300	DK2300W	DK2300Y	DK2300	KDB2300W	KDB2300
350	DK2350W	DK2350Y	DK2350	KDB2350W	KDB2350
400	DK2400W	DK2400Y	DK2400	KDB2400W	KDB2400
<b>Three-Pole</b>					
100	—	—	—	KDB3100W	KDB3100
125	—	—	—	KDB3125W	KDB3125
150	—	—	—	KDB3150W	KDB3150
175	—	—	—	KDB3175W	KDB3175
200	—	—	—	KDB3200W	KDB3200
225	—	—	—	KDB3225W	KDB3225
250	DK3250W	DK3250Y	DK3250	KDB3250W	KDB3250
300	DK3300W	DK3300Y	DK3300	KDB3300W	KDB3300
350	DK3350W	DK3350Y	DK3350	KDB3350W	KDB3350
400	DK3400W	DK3400Y	DK3400	KDB3400W	KDB3400

**Molded Case Switches**

Eaton’s molded case switches are used as compact switches in applications requiring high current switching capabilities. Molded case switches are constructed of circuit breaker

components and are of the high instantaneous automatic type. Molded case switches are listed in accordance with Underwriters Laboratories Standard UL 489.

**Molded Case Switches**

Maximum Continuous Ampere Rating at 40°C	240 Vac Maximum, 250 Vdc	600 Vac Maximum, 250 Vdc	600 Vac Maximum, 250 Vdc
	Complete Circuit Breaker with Standard Line and Load Terminals Catalog Number	Complete Circuit Breaker with Standard Line and Load Terminals Catalog Number	Complete Circuit Breaker with Standard Line and Load Terminals. Suitable for Reverse Feed Use Catalog Number
<b>Two-Pole</b>			
400	DK2400K	KD2400K	KDB2400K
	—	HKD2400K	HKDB2400K
<b>Three-Pole</b>			
400	DK3400K	KD3400K	KDB3400K
	—	HKD3400K	HKDB3400K
<b>Four-Pole</b>			
400	—	KD4400K	KDB4400K
	—	HKD4400K	HKDB4400K

**Note**

Molded case switches may open above 4000 amperes.



# 2.3

## Molded Case Circuit Breakers

### Series C

2

#### 100% Rated Types CKD and CHKD Electronic Circuit Breakers

The NEC allows the breaker to be rated at 100% of its frame size in an assembly, provided that 90°C wire is applied at the 75°C ampacity. All 100% rated circuit breakers have electronic trip units.

#### 100% Rated Types CKD and CHKD Electronic Circuit Breakers—Three-Pole

See 310+ adjustability specifications on **Page V4-T2-176**.

	Circuit Breaker Frame Only		Digitrip RMS 310+ Trip Unit Only		Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay and Ground Fault Protection	Independently Adjustable Short Time Pickup and Delay and Ground Fault Protection	Terminal Information
	Standard Interrupting Capacity	High Interrupting Capacity	Standard	Options			
Maximum Continuous Ampere Rating at 40°C	35 kAIC at 480 Vac Catalog Number	65 kAIC at 480 Vac	Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay Ramp	Independently Adjustable Short Time Pickup and Delay			
125	CKD3400F	CHKD3400F	KES3125LS	KES3125LSI	KES3125LSG	KES3125LSIG	See <b>Page V4-T2-173</b>
250	CKD3400F	CHKD3400F	KES3250LS	KES3250LSI	KES3250LSG	KES3250LSIG	
400	CKD3400F	CHKD3400F	KES3400LS	KES3400LSI	KES3400LSG	KES3400LSIG	

**Digitrip OPTIM 550 Electronic Circuit Breakers with Interchangeable Rating Plug**

Order as individual components: breaker frame (which includes trip unit), rating plug, terminals.

**Digitrip OPTIM 550 Electronic Circuit Breakers with Interchangeable Rating Plug**

**Digitrip OPTIM Rating Plug Only**

**Circuit Breaker Frame Only**

- L – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time ( $I^2t$  or  $I^4t$  Response) ①
- S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$  or Flat Response)
- I – Adjustable Instantaneous Pickup
- G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time ( $I^2t$  or Flat Response)
- A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time ( $I^2t$  or Flat Response)

**OPTIM 550 ②**

Maximum  
Continuous  
Ampere  
Rating  
at 40°C

LSI  
Catalog  
Number

LSIG  
Catalog  
Number

LSIA  
Catalog  
Number

Ampere  
Rating

Fixed Rating Plug  
Catalog  
Number

**Three-Pole Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac**

125	KD3125T52W	KD3125T56W	KD3125T57W	70	ORPK125A70
				90	ORPK125A90
				100	ORPK125A100
				110	ORPK125A110
				125	ORPK125A125
250	KD3250T52W	KD3250T56W	KD3250T57W	125	ORPK025A125
				150	ORPK025A150
				175	ORPK025A175
				200	ORPK025A200
				225	ORPK025A225
				250	ORPK025A250
400	KD3400T52W	KD3400T56W	KD3400T57W	200	ORPK40A200
				225	ORPK40A225
				250	ORPK40A250
				300	ORPK40A300
				350	ORPK40A350
				400	ORPK40A400

**Notes**

- ① Long delay  $I^4t$  response selection limits short delay time to flat response.
- ② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.

#### Digitrip OPTIM 550 Electronic Circuit Breakers with Interchangeable Rating Plug, continued

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only			Digitrip OPTIM Rating Plug Only	
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
	L – Adjustable Long Delay Pickup (I <sub>1</sub> ) with Adjustable Long Delay Time (I <sup>2</sup> t or I <sup>4</sup> t Response) ① S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I <sup>2</sup> t or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time (I <sup>2</sup> t or Flat Response) A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time (I <sup>2</sup> t or Flat Response)				
	OPTIM 550 ②				
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>					
125	HKD3125T52W	HKD3125T56W	HKD3125T57W	70	ORPK125A70
				90	ORPK125A90
				100	ORPK125A100
				110	ORPK125A110
				125	ORPK125A125
250	HKD3250T52W	HKD3250T56W	HKD3250T57W	125	ORPK025A125
				150	ORPK025A150
				175	ORPK025A175
				200	ORPK025A200
				225	ORPK025A225
				250	ORPK025A250
400	HKD3400T52W	HKD3400T56W	HKD3400T57W	200	ORPK40A200
				225	ORPK40A225
				250	ORPK40A250
				300	ORPK40A300
				350	ORPK40A350
				400	ORPK40A400

**Notes**

① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.

② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.

Digitrip OPTIM 550 Electronic Circuit Breakers with Interchangeable Rating Plug, continued

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only			Digitrip OPTIM Rating Plug Only	
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
	L – Adjustable Long Delay Pickup (I <sub>1</sub> ) with Adjustable Long Delay Time (I <sup>2</sup> t or I <sup>4</sup> t Response) ① S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I <sup>2</sup> t or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time (I <sup>2</sup> t or Flat Response) A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time (I <sup>2</sup> t or Flat Response)				
	OPTIM 550 ②				
<b>Three-Pole Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac</b>					
125	KDC3125T52W	KDC3125T56W	KDC3125T57W	70	ORPK125A70
				90	ORPK125A90
				100	ORPK125A100
				110	ORPK125A110
				125	ORPK125A125
250	KDC3250T52W	KDC3250T56W	KDC3250T57W	125	ORPK025A125
				150	ORPK025A150
				175	ORPK025A175
				200	ORPK025A200
				225	ORPK025A225
				250	ORPK025A250
400	KDC3400T52W	KDC3400T56W	KDC3400T57W	200	ORPK40A200
				225	ORPK40A225
				250	ORPK40A250
				300	ORPK40A300
				350	ORPK40A350
				400	ORPK40A400

Notes

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.
- ② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.

# 2.3

## Molded Case Circuit Breakers

### Series C

#### Digitrip OPTIM 1050 Electronic Circuit Breakers with Interchangeable Rating Plug

Order as individual components: breaker frame (which includes trip unit), rating plug, terminals.

2

#### Digitrip OPTIM 1050 Electronic Circuit Breakers with Interchangeable Rating Plug

##### Circuit Breaker Frame Only

L – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time ( $I^2t$  or  $I^4t$  Response) ①

S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$  or Flat Response)

I – Adjustable Instantaneous Pickup

G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time ( $I^2t$  or Flat Response)

A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time ( $I^2t$  or Flat Response)

##### OPTIM 1050 ②

##### Digitrip OPTIM Rating Plug Only

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only		Digitrip OPTIM Rating Plug Only	
	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac</b>				
125	KD3125T106W	KD3125T107W	70	ORPK125A70
			90	ORPK125A90
			100	ORPK125A100
			110	ORPK125A110
			125	ORPK125A125
250	KD3250T106W	KD3250T107W	125	ORPK025A125
			150	ORPK025A150
			175	ORPK025A175
			200	ORPK025A200
			225	ORPK025A225
400	KD3400T106W	KD3400T107W	250	ORPK025A250
			200	ORPK40A200
			225	ORPK40A22
			250	ORPK40A250
			300	ORPK40A300
			350	ORPK40A350
			400	ORPK40A400

#### Notes

① Long delay  $I^4t$  response selection limits short delay time to flat response.

② Factory sealed.

**Digitrip OPTIM 1050 Electronic Circuit Breakers with Interchangeable Rating Plug, continued**

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only		Digitrip OPTIM Rating Plug Only	
	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>				
125	HKD3125T106W	HKD3125T107W	70	ORPK125A70
			90	ORPK125A90
			100	ORPK125A100
			110	ORPK125A110
			125	ORPK125A125
250	HKD3250T106W	HKD3250T107W	125	ORPK025A125
			150	ORPK025A150
			175	ORPK025A175
			200	ORPK025A200
			225	ORPK025A225
			250	ORPK025A250
			400	ORPK025A400
400	HKD3400T106W	HKD3400T107W	200	ORPK40A200
			225	ORPK40A225
			250	ORPK40A250
			300	ORPK40A300
			350	ORPK40A350
			400	ORPK40A400

**Notes**

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.
- ② Factory sealed.

# 2.3

## Molded Case Circuit Breakers

### Series C

2

#### Digitrip OPTIM 1050 Electronic Circuit Breakers with Interchangeable Rating Plug, continued

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only		Digitrip OPTIM Rating Plug Only	
	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
	L – Adjustable Long Delay Pickup (I <sub>1</sub> ) with Adjustable Long Delay Time (I <sup>2</sup> t or I <sup>4</sup> t Response) ① S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I <sup>2</sup> t or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time (I <sup>2</sup> t or Flat Response) A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time (I <sup>2</sup> t or Flat Response)			
	OPTIM 1050 ②			
<b>Three-Pole Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac</b>				
125	KDC3125T106W	KDC3125T107W	70	ORPK125A70
			90	ORPK125A90
			100	ORPK125A100
			110	ORPK125A110
			125	ORPK125A125
250	KDC3250T106W	KDC3250T107W	125	ORPK025A125
			150	ORPK025A150
			175	ORPK025A175
			200	ORPK025A200
			225	ORPK025A225
			250	ORPK025A250
400	KDC3400T106W	KDC3400T107W	200	ORPK40A200
			225	ORPK40A225
			250	ORPK40A250
			300	ORPK40A300
			350	ORPK40A350
			400	ORPK40A400

**Notes**

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.
- ② Factory sealed.

**100% Rated Digitrip OPTIM 550 Electronic Circuit Breakers with Interchangeable Rating Plug**

Order as individual components: breaker frame (which includes trip unit), rating plug, terminals.

**100% Rated Digitrip OPTIM 550 Electronic Circuit Breakers with Interchangeable Rating Plug**

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only			Digitrip OPTIM Rating Plug Only	
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac</b>					
125	CKD3125T52W	CKD3125T56W	CKD3125T57W	70	ORPK125A70
				90	ORPK125A90
				100	ORPK125A100
				110	ORPK125A110
				125	ORPK125A125
250	CKD3250T52W	CKD3250T56W	CKD3250T57W	125	ORPK025A125
				150	ORPK025A150
				175	ORPK025A175
				200	ORPK025A200
				225	ORPK025A225
400	CKD3400T52W	CKD3400T56W	CKD3400T57W	200	ORPK40A200
				225	ORPK40A225
				250	ORPK40A250
				300	ORPK40A300
				350	ORPK40A350
				400	ORPK40A400

**Notes**

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.
- ② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number (refer to **Page V4-T2-288**).



# 2.3

## Molded Case Circuit Breakers

### Series C

2

#### 100% Rated Digitrip OPTIM 550 Electronic Circuit Breakers with Interchangeable Rating Plug, continued

##### Circuit Breaker Frame Only

- L – Adjustable Long Delay Pickup ( $I_t$ ) with Adjustable Long Delay Time ( $I^2t$  or  $I^4t$  Response) ①
- S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$  or Flat Response)
- I – Adjustable Instantaneous Pickup
- G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time ( $I^2t$  or Flat Response)
- A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time ( $I^2t$  or Flat Response)

##### Digitrip OPTIM Rating Plug Only

Maximum Continuous Ampere Rating at 40°C	OPTIM 550 ②			Ampere Rating	Fixed Rating Plug Catalog Number
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number		
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>					
125	CHKD3125T52W	CHKD3125T56W	CHKD3125T57W	70	ORPK125A70
				90	ORPK125A90
				100	ORPK125A100
				110	ORPK125A110
				125	ORPK125A125
250	CHKD3250T52W	CHKD3250T56W	CHKD3250T57W	125	ORPK025A125
				150	ORPK025A150
				175	ORPK025A175
				200	ORPK025A200
				225	ORPK025A225
				250	ORPK025A250
400	CHKD3400T52W	CHKD3400T56W	CHKD3400T57W	200	ORPK40A200
				225	ORPK40A225
				250	ORPK40A250
				300	ORPK40A300
				350	ORPK40A350
				400	ORPK40A400

#### Notes

- ① Long delay  $I^4t$  response selection limits short delay time to flat response.
- ② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.

**100% Rated Digitrip OPTIM 1050 Electronic Circuit Breakers with Interchangeable Rating Plug**

Order as individual components: breaker frame (which includes trip unit), rating plug, terminals.

**100% Rated Digitrip OPTIM 1050 Electronic Circuit Breakers with Interchangeable Rating Plug**

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only		Digitrip OPTIM Rating Plug Only	
	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac</b>				
125	CKD3125T106W	CKD3125T107W	70	ORPK125A70
			90	ORPK125A90
			100	ORPK125A100
			110	ORPK125A110
			125	ORPK125A125
250	CKD3250T106W	CKD3250T107W	125	ORPK025A125
			150	ORPK025A150
			175	ORPK025A175
			200	ORPK025A200
			225	ORPK025A225
400	CKD3400T106W	CKD3400T107W	250	ORPK025A250
			200	ORPK40A200
			225	ORPK40A225
			250	ORPK40A250
			300	ORPK40A300
			350	ORPK40A350
			400	ORPK40A400

**Notes**

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.
- ② Factory sealed.

# 2.3

## Molded Case Circuit Breakers

### Series C

2

#### 100% Rated Digitrip OPTIM 1050 Electronic Circuit Breakers with Interchangeable Rating Plug, continued

**Circuit Breaker Frame Only**

- L – Adjustable Long Delay Pickup ( $I_t$ ) with Adjustable Long Delay Time ( $I^2t$  or  $I^4t$  Response) ①
- S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$  or Flat Response)
- I – Adjustable Instantaneous Pickup
- G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time ( $I^2t$  or Flat Response)
- A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time ( $I^2t$  or Flat Response)

**Digitrip OPTIM Rating Plug Only**

Maximum Continuous Ampere Rating at 40°C	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>				
125	CHKD3125T106W	CHKD3125T107W	70	ORPK125A70
			90	ORPK125A90
			100	ORPK125A100
			110	ORPK125A110
			125	ORPK125A125
250	CHKD3250T106W	CHKD3250T107W	125	ORPK025A125
			150	ORPK025A150
			175	ORPK025A175
			200	ORPK025A200
			225	ORPK025A225
			250	ORPK025A250
400	CHKD3400T106W	CHKD3400T107W	200	ORPK40A200
			225	ORPK40A225
			250	ORPK40A250
			300	ORPK40A300
			350	ORPK40A350
			400	ORPK40A400

**Notes**

- ① Long delay  $I^4t$  response selection limits short delay time to flat response.
- ② Factory sealed.

**Accessories Selection Guide and Ordering Guide**

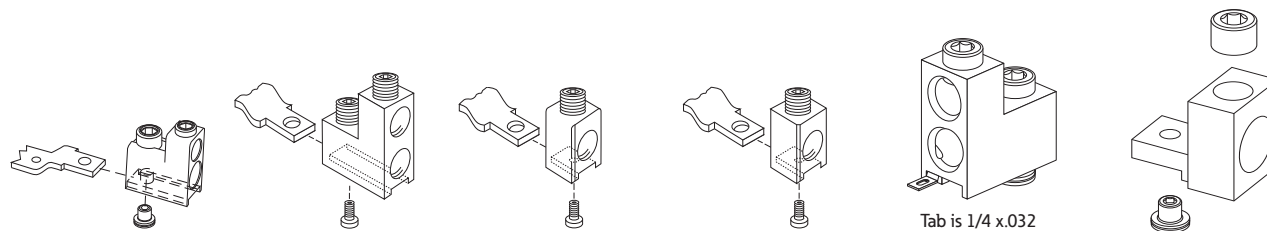
**Line and Load Terminals**

Eaton’s line and load terminals provide wire connecting capabilities for specific ranges of continuous current ratings and wire types. All terminals comply with Underwriters Laboratories Standards

UL 486A and UL 486B and CSA Standard C22.2 No. 65, or Electrical Bulletin 1165. Unless otherwise specified, K-Frame circuit breaker line and load terminals are shipped separately for field installation.

**Ordering Information**

K-Frame circuit breakers use Cu/Al terminals as standard. When optional copper or Cu/Al terminals are required, order by catalog number. Specify if factory installation is required.



**TA401K**      **TA400K, T400K**      **TA350K, T350K**      **TA300K, T300K**      **T400KCW, TA400KCW, TA401KCW**      **TA402K, T402K**

**Line and Load Terminals**

Maximum Breaker Amperes	Terminal Body Material	Wire Type	AWG Wire Range/No. Conductors	Metric Wire Range mm <sup>2</sup>	Terminal Catalog Number	Terminals with Control Wire Termination Catalog Number
<b>Standard Cu/Al Pressure Terminals</b>						
225	Aluminum	Cu/Al	3–350 (1)	35–185	<b>TA300K</b> ①	—
400	Aluminum	Cu/Al	250–500 (1)	120–240	<b>TA350K</b> ①	—
400	Aluminum	Cu/Al	3/0–250 (2)	95–120	<b>2TA400K</b> ②③	<b>2TA400KCW</b> ②③
400	Aluminum	Cu/Al	3/0–250 (2)	95–120	<b>3TA400K</b> ②④	<b>3TA400KCW</b> ②④
400	Aluminum	Cu/Al	3/0–250 (2)	95–120	<b>4TA400K</b> ⑤⑥	<b>4TA400KCW</b> ⑤⑥
<b>Optional Copper and Cu/Al Pressure Type Terminals</b>						
225	Copper	Cu	3–350 (1)	35–185	<b>T300K</b> ①	—
400	Copper	Cu	250–500 (1)	120–240	<b>T350K</b> ①	—
400	Copper	Cu	3/0–250 (2)	95–120	<b>2T400K</b> ③	<b>2T400KCW</b> ②③
					<b>3T400K</b> ④	<b>3T400KCW</b> ②④
					<b>4T400K</b> ⑤	<b>4T400KCW</b> ⑤⑥
400	Aluminum	Cu/Al	2/0–250 (2) or 2/0–500 (1)	70–120	<b>2TA401K</b> ②③	<b>2TA401KCW</b> ②③
				70–240	<b>3TA401K</b> ②④	<b>3TA401KCW</b> ②④
				70–240	<b>4TA401K</b> ⑤⑥	<b>4TA401KCW</b> ⑤⑥
400	Aluminum	Cu/Al	500–750 (1)	300–400	<b>2TA402K</b> ②③	—
					<b>3TA402K</b> ②④	—
					<b>4TA402K</b> ⑤⑥	—
400	Copper	Cu	500–750 (1)	—	<b>2T402K</b> ②③	—
					<b>3T402K</b> ②④	—
					<b>4T402K</b> ⑤⑥	—

**Notes**

- ① Individually packed.
- ② Terminal kits contain one terminal for each pole and one terminal cover.
- ③ Two-pole kit.
- ④ Three-pole kit.
- ⑤ Four-pole kit.
- ⑥ Terminal kits contain one terminal for each pole and three interphase barriers.

# 2.3

## Molded Case Circuit Breakers

### Series C

#### Accessories

##### Allowable Accessory Combinations

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

##### KD Frame Accessories

Description	Reference Page	Two-Pole ①		Three-Pole			Four-Pole			Neutral
		Left	Right	Left	Center	Right	Left	Center	Right	
<b>Internal Accessories (Only One Internal Accessory Per Pole)</b>										
Alarm lockout (Make/Break)	V4-T2-271		■	□		□		■		
Alarm lockout (2Make/2Break)	V4-T2-271			□		□		■		
Auxiliary switch (1A, 1B)	V4-T2-273		■	■		■		■		■
Auxiliary switch (2A, 2B)	V4-T2-273			■		■		■		■
Auxiliary switch (3A, 3B)	V4-T2-273			■		■		■		■
Auxiliary switch and alarm switch combination	V4-T2-274			□		□		□		□
Shunt trip—standard ②	V4-T2-277		■	■		■		■		■
Shunt trip—low energy ②	V4-T2-280			■		■		■		
Undervoltage release mechanism ②	V4-T2-285		■	■		■		■		
PowerNet or zone interlock kit (OPTIM 550)	V4-T2-288					■				
<b>External Accessories</b>										
End cap kit	V4-T2-303	●	●	●	●	●	●	●	●	●
Keeper nut	V4-T2-303	●	●	●	●	●	●	●	●	●
Control wire terminal kit	V4-T2-304	●	●	●	●	●	●	●	●	●
Terminal adapter	V4-T2-304	●	●	●	●	●	●	●	●	●
Multewire connectors	V4-T2-305	●	●	●	●	●	●	●	●	●
Base mounting hardware	V4-T2-306	●	●	●	●	●	●	●	●	●
Terminal shields	V4-T2-308	●	●	●	●	●	●	●	●	●
Interphase barriers	V4-T2-308	●	●	●	●	●	●	●	●	●
Non-padlockable handle block	V4-T2-309	■			■			■		
Padlockable handle block	V4-T2-309				■					
Padlockable handle lock hasp	V4-T2-310		■	□		□	□		□	
Cylinder lock	V4-T2-310	□	□	□		□				
Key Interlock kit	V4-T2-311	■	□	□		□	□		□	
Sliding bar interlock—requires two breakers	V4-T2-312			●	●	●				
Walking beam interlock—requires two breakers	V4-T2-312			●	●	●	●	●	●	●
Electrical (solenoid) operator	V4-T2-313			●	●	●	●	●	●	●
Plug-in adapters	V4-T2-314	●	●	●	●	●	●	●	●	●
Rear connecting studs	V4-T2-316	●	●	●	●	●	●	●	●	●
Panelboard connecting straps	V4-T2-317	●	●	●	●	●	●	●	●	●
Handle mechanisms	V4-T2-419	●	●	●	●	●	●	●	●	●
Handle extension	V4-T2-434	●	●	●	●	●	●	●	●	●
IQ Energy Sentinel	V4-T2-319			●	●	●	●	●	●	●
Solid-state (electronic) portable test kit	V4-T2-319	●	●	●	●	●	●	●	●	●

##### Legend

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

##### Notes

- ① Two-pole breaker supplied in three-pole frame. Current carrying parts omitted from center pole.
- ② Shunt trip and UVR cannot be mounted in right poles on KES or OPTIM trip units. Standard internal accessories cannot be mounted in right pole on any K-Frame OPTIM trip units. Special OPTIM ground fault and zone interlock accessories are available for field installation in the right pole of K-Frame 550 OPTIM trip units. Factory installed 2a/2b and bell/aux are available for factory installation. K-Frame breakers equipped with OPTIM 1050 trip units include aux-bell alarm in the right pole.

**KD Frame Accessories, continued**

Description	Reference Page	Two-Pole <sup>①</sup>		Three-Pole			Four-Pole			
		Left	Right	Left	Center	Right	Left	Center	Right	Neutral
<b>OPTIM System Components Three Poles</b>										
Breaker interface module (BIM)	V4-T2-320									
Digitrip OPTIMizer	V4-T2-320									
Auxiliary power module	V4-T2-320									
<b>Modifications (Refer to Eaton)</b>										
Special calibration	—	●	●	●	●	●	●	●	●	●
Moisture fungus treatment	V4-T2-110	●	●	●	●	●	●	●	●	●
Freeze-tested circuit breakers	—	●	●	●	●	●	●	●	●	●
Marine/naval application	—	●	●	●	●	●	●	●	●	●

**Legend**

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

**Technical Data and Specifications**

**NEMA/UL 489/CSA Interrupting Capacity Ratings**

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)					Volts DC 250 <sup>②③</sup>
		Volts AC (50/60 Hz)					
		240	277	480	600		
DK	2, 3	65	—	—	—	10	
KDB	2, 3, 4	65	—	35	25	10	
KD	2, 3, 4	65	—	35	25	10	
HKD, HKDB	2, 3, 4	100	—	65	35	22	
KDC <sup>④</sup>	2, 3, 4	200	—	100	65	22	
CKD	3	65	—	35	25	—	
CHKD	3	100	—	65	35	—	

**IEC 157-1 (P1) Interrupting Capacity Ratings**

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)						Volts DC 250 <sup>②③</sup>
		Volts AC (50/60 Hz)						
		240	380	415	440	500	600	
DK	2, 3	65	—	—	—	—	10	
KDB	2, 3, 4	65	40	40	—	—	10	
KD	2, 3, 4	65	40	40	—	—	10	
HKD, HKDB	2, 3, 4	100	65	65	—	—	22	
KDC	2, 3, 4	200	100	100	—	—	22	

**Notes**

- ① Two-pole breaker supplied in three-pole frame. Current carrying parts omitted from center pole.
- ② Two-pole circuit breaker or two outside poles of three-pole circuit breaker.
- ③ Time constant is 3 milliseconds minimum at 10 kA and 8 milliseconds minimum at 22 kA.
- ④ Current limiting.

# 2.3

## Molded Case Circuit Breakers

### Series C

2

#### 310+ Specifications

Trip Unit Type	Digitrip RMS 310+
<b>Breaker Type</b>	
Frame	K
Ampere range	250–400A
Continuous current range (A)	55–400A
Ground fault pickup (A)	50–400A
Interrupting capacities at 480 Vac (kAIC)	35, 65, 100
100% rated	Yes
<b>Protection</b>	
Ordering options	LS, LSI, LSG, LS(A), LSIG, LSI(A), ALSI, ALSIG, ALSI(A)
Arcflash Reduction Maintenance System	ALSI, ALSIG, ALSI(A)
Interchangeable trip unit	Yes
High load alarm, trip (suffix B20)	Yes
Ground fault alarm, trip (suffix B21)	LSG, LSIG, ALSIG
Zone selective interlock (suffix ZG)	Yes
Cause of trip indication (Catalog Nos: DIGIVIEW, DIGIVIEWR06, TRIP-LED)	Yes
Thru-cover accessories	No

#### 310+ Adjustability Specifications

310+ Settings	K-Frame			
	125A	250A	400A	
$I_r$ = continuous current or long delay pickup (amperes) (All 310+)	$I_r \setminus I_n$			
	A (=I <sub>r</sub> )	55	100	160
	B (=I <sub>r</sub> )	60	125	200
	C (=I <sub>r</sub> )	70	150	225
	D (=I <sub>r</sub> )	80	160	250
	E (=I <sub>r</sub> )	90	175	300
	F (=I <sub>r</sub> )	100	200	315
	G (=I <sub>r</sub> )	110	225	350
	H (=I <sub>r</sub> =I <sub>n</sub> )	125	250	400
	$t_{LD}$ = long delay time (seconds) (All 310+)	2	2	2
4		4	4	4
7		7	7	7
10		10	10	10
12		12	12	12
15		15	15	15
20		20	20	20
24		24	24	24
$I_{SD} \times I_r$ = short delay pickup (amperes) (All 310+)	Position 1	2	2x	2x
	Position 2	3	3x	3x
	Position 3	4	4x	4x
	Position 4	5	5x	5x
	Position 5	6	6x	6x
	Position 6	7	7x	7x
	Position 7	8	8x	8x
	Position 8	10	10x	10x
	Position 9	12	12x	12x
$I_g \times I_n$ = ground fault pickup (amperes) (310+ w/ground fault)	Position 1	25	50	80
	Position 2	37.5	75	120
	Position 3	50	100	160
	Position 4	75	150	240
	Position 5	100	200	320
	Position 6	125	250	400
$I_i \times I_n$ = instantaneous maintenance mode (amperes) (310+ w/maintenance mode)	Position 1 (2.5x)	312	625	1000
	Position 2 (4x)	312	625	1000
	Position 3 (6x)	312	625	1000
	Position 4	312	625	1000
	Position 5	312	625	1000
	Position 6	312	625	1000
	Position 7	312	625	1000

**Note:** RMM on KD310+ is not adjustable; it is set at 2.5x.

## Specifications

Trip Unit Type	Digitrip OPTIM 550	Digitrip OPTIM 1050
rms sensing	Yes	Yes
<b>Breaker Type</b>		
Frame	K	K
Ampere range	125–400A	125–400A
Interrupting rating at 480 volts	35, 65, 100 (kA)	35, 65, 100 (kA)
<b>Protection</b>		
Ordering options	LSI, LSI(A), LSIG	LSI(A), LSIG
Fixed rated plug ( $I_n$ )	Yes	Yes
Overtemperature trip	Yes	Yes
<b>Long Delay Protection (L)</b>		
Adjustable rating plug ( $I_n$ )	No	No
Long delay pickup	0.4–1.0 x ( $I_n$ )	0.4–1.0 x ( $I_n$ )
Long delay time $I^2t$	2–24 seconds	2–24 seconds
Long delay time $I^4t$	1–5 seconds	1–5 seconds
Long delay thermal memory	Yes	Yes
High load alarm	0.5–1.0 x $I_r$	0.5–1.0 x $I_r$
<b>Short Delay Protection (S)</b>		
Short delay pickup	150–800% x ( $I_r$ )	150–800% x ( $I_r$ )
Short delay time $I^2t$	100–500 ms	100–500 ms
Short delay time flat	100–500 ms	100–500 ms
Short delay time zone selective interlocking	Yes <sup>①</sup>	Yes
<b>Instantaneous Protection (I)</b>		
Instantaneous pickup	200–800% x ( $I_n$ )	200–800% x ( $I_n$ )
Discriminator	Yes	Yes
Instantaneous override	Yes	Yes
<b>Ground Fault Protection (G)</b>		
Ground fault alarm	20–100% x ( $I_s$ )	20–100% x ( $I_s$ )
Ground fault pickup	20–100% x ( $I_s$ )	20–100% x ( $I_s$ )
Ground fault delay $I^2t$	100–500 ms	100–500 ms
Ground fault delay flat	100–500 ms	100–500 ms
Ground fault zone selective interlocking	Yes <sup>①</sup>	Yes
Ground fault thermal memory	Yes	Yes
<b>System Diagnostics</b>		
Status LEDs	Yes	Yes
Cause of trip LEDs	Yes	Yes
Magnitude of trip information	Yes	Yes
Remote signal contact—ground alarm	Yes <sup>①</sup>	Yes
Local auxiliary and bell alarm contact	Optional	Included
<b>System Monitoring</b>		
Digital display	Yes <sup>②</sup>	Yes <sup>②</sup>
Current	Yes	Yes
Power and energy	No	Yes
Power quality—harmonics	No	Yes
Power factor	No	Yes
<b>Communications</b>		
PowerNet	Yes <sup>③</sup>	Yes
<b>Testing</b>		
Testing method	OPTIMizer, BIM, PowerNet	OPTIMizer, BIM, PowerNet

**Legend**

BIM = Breaker Interface Module  
(A) = GF Alarm  
 $I_s$  = Sensor Rating  
 $I_n$  = Rating Plug  
 $I_r$  = Long Delay Pickup Setting

**Notes**

- ① Zone interlock kit.  
② By OPTIMizer/BIM.  
③ Eaton's PowerNet kit.



# 2.3

## Molded Case Circuit Breakers

### Series C

#### Dimensions and Weights

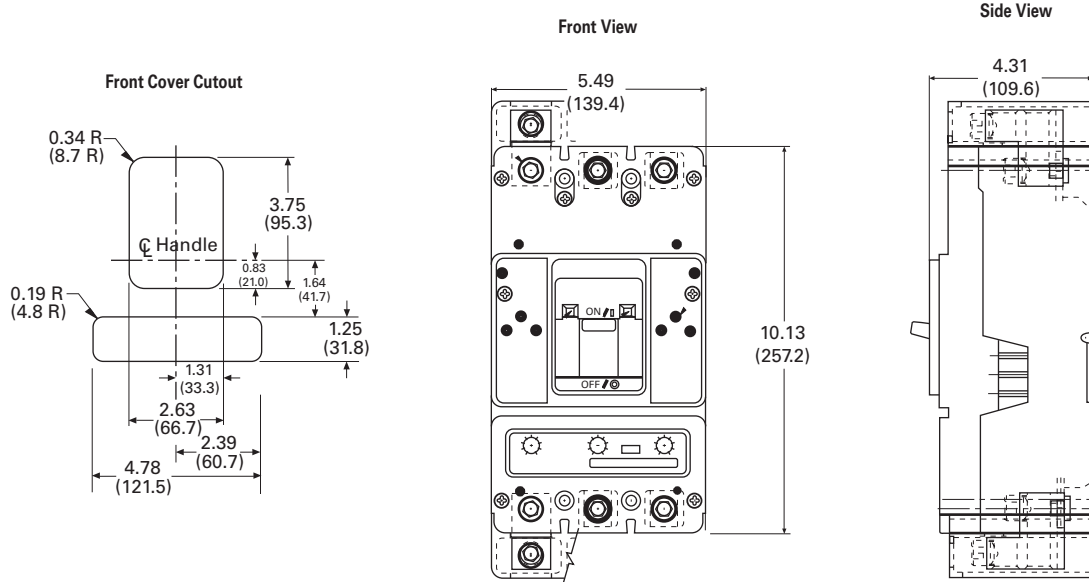
Approximate Dimensions in Inches (mm)

2

#### KD Frame

Number of Poles	Width	Height	Depth
2, 3	5.50 (149.7)	10.13 (257.3)	4.10 (104.1)
4	7.22 (183.4)	10.13 (257.3)	4.10 (104.1)

#### KD-Frame, Two- and Three-Pole



Approximate Shipping Weight, Lbs (kg)

#### KD Frame

Breaker Type	Complete Breaker		Frame Only		Trip Unit ①	
	Two-Pole	Three-Pole	Two-Pole	Three-Pole	Two-Pole	Three-Pole
DK	10.0 (4.5)	11.5 (5.2)	—	—	—	—
KDB	10.0 (4.5)	11.5 (5.2)	—	—	—	—
KD	10.0 (4.5)	11.5 (5.2)	7.5 (3.4)	8.5 (3.9)	1.5 (0.7)	1.5 (0.7)
HKD, HKDB	10.0 (4.5)	11.5 (5.2)	7.5 (3.4)	8.5 (3.9)	1.5 (0.7)	1.5 (0.7)
KDC	10.0 (4.5)	11.5 (5.2)	7.5 (3.4)	8.5 (3.9)	1.5 (0.7)	1.5 (0.7)

#### Note

① Weights shown are for thermal-magnetic trip units. Three-pole electronic trip units weigh 2.5 lbs (1.1 kg).

Typical L-Frame Circuit Breaker



**Contents**

<i>Description</i>	<i>Page</i>
Product Overview . . . . .	<b>V4-T2-110</b>
Standards and Certifications . . . . .	<b>V4-T2-111</b>
Quick Reference . . . . .	<b>V4-T2-112</b>
G-Frame (15–100 Amperes) . . . . .	<b>V4-T2-115</b>
F-Frame (10–225 Amperes) . . . . .	<b>V4-T2-129</b>
J-Frame (70–250 Amperes) . . . . .	<b>V4-T2-146</b>
K-Frame (70–400 Amperes) . . . . .	<b>V4-T2-154</b>
L-Frame (125–600 Amperes)	
Catalog Number Selection . . . . .	<b>V4-T2-180</b>
Product Selection . . . . .	<b>V4-T2-181</b>
Accessories . . . . .	<b>V4-T2-199</b>
Technical Data and Specifications . . . . .	<b>V4-T2-201</b>
Dimensions and Weights . . . . .	<b>V4-T2-204</b>
M-Frame (300–800 Amperes) . . . . .	<b>V4-T2-205</b>
N-Frame (400–1200 Amperes) . . . . .	<b>V4-T2-216</b>
R-Frame (800–2500 Amperes) . . . . .	<b>V4-T2-231</b>
Motor Circuit Protectors (MCP) . . . . .	<b>V4-T2-250</b>
Motor Protection Circuit Breakers (MPCB) . . . . .	<b>V4-T2-261</b>
Type ELC Current Limiter Attachment (Size 0–4) . . . . .	<b>V4-T2-263</b>
Current Limiting Circuit Breaker Module . . . . .	<b>V4-T2-264</b>
Internal Accessories . . . . .	<b>V4-T2-268</b>
External Accessories . . . . .	<b>V4-T2-299</b>

**L-Frame (125–600 Amperes)**

**Product Description**

- All Eaton L-Frame circuit breakers are HACR rated
- L-Frame circuit breakers are available as individual components (frame, trip unit, terminals), or factory assembled complete breakers
- L-Frame circuit breakers with non-interchangeable trip units are suitable for reverse feed use

**Standards and Certifications**

- CE marked



# 2.3

## Molded Case Circuit Breakers

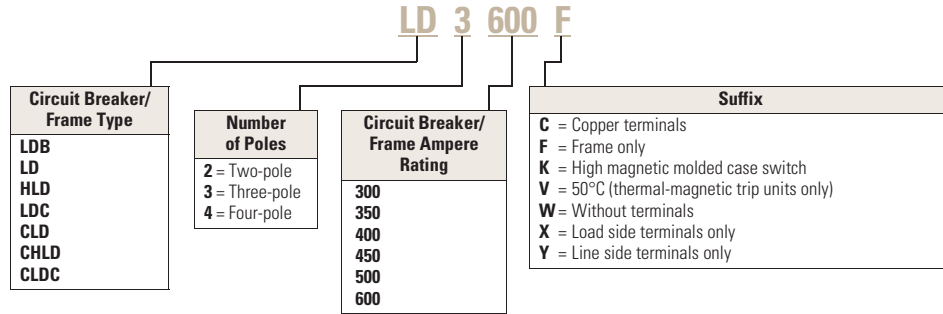
Series C

### Catalog Number Selection

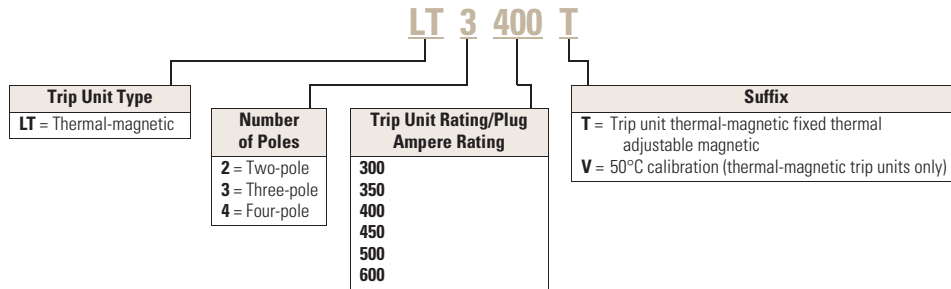
This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

2

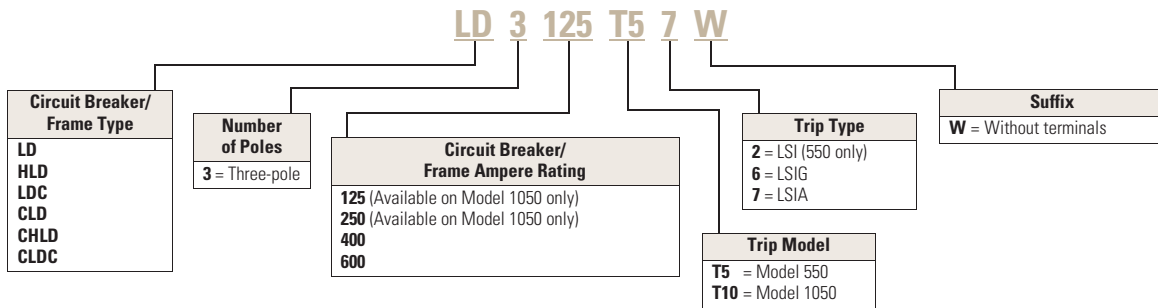
#### Circuit Breaker/Frame



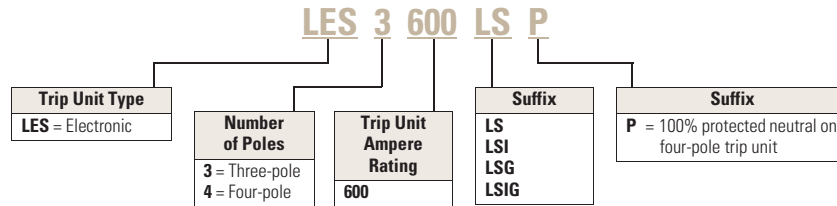
#### Thermal-Magnetic Trip Unit



#### OPTIM Circuit Breaker/Frame



#### Digitrip RMS 310 Trip Unit



## Product Selection

2

## Types LD, HLD and LDC Thermal-Magnetic Circuit Breakers with Interchangeable Trip Units

Maximum Continuous Ampere Rating at 40°C ①	Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac	Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac	Thermal-Magnetic Trip Unit Only	Standard Terminals Only
	Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals Catalog Number	Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals Catalog Number	Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals Catalog Number	For Use with Standard or High or Ultra High Interrupting Frames Catalog Number	See Page V4-T2-198 for Optional Terminals Catalog Number
<b>Two-Pole</b>					
300	LD2300	HLD2300	LDC2300	LT2300T	TA602LD ②
350	LD2350	HLD2350	LDC2350	LT2350T	TA602LD ②
400	LD2400	HLD2400	LDC2400	LT2400T	TA602LD ②
450	LD2450	HLD2450	LDC2450	LT2450T	TA602LD ②
500	LD2500	HLD2500	LDC2500	LT2500T	TA602LD ②
600	LD2600	HLD2600	LDC2600	LT2600T	2TA603LDK ③
<b>Three-Pole</b>					
300	LD3300	HLD3300	LDC3300	LT3300T	TA602LD ②
350	LD3350	HLD3350	LDC3350	LT3350T	TA602LD ②
400	LD3400	HLD3400	LDC3400	LT3400T	TA602LD ②
450	LD3450	HLD3450	LDC3450	LT3450T	TA602LD ②
500	LD3500	HLD3500	LDC3500	LT3500T	TA602LD ②
600	LD3600	HLD3600	LDC3600	LT3600T	3TA603LDK ③
<b>Four-Pole ④</b>					
300	LD4300	HLD4300	LDC4300	LT4300T	TA602LD ②
350	LD4350	HLD4350	LDC4350	LT4350T	TA602LD ②
400	LD4400	HLD4400	LDC4400	LT4400T	TA602LD ②
450	LD4450	HLD4450	LDC4450	LT4450T	TA602LD ②
500	LD4500	HLD4500	LDC4500	LT4500T	TA602LD ②
600	LD4600	HLD4600	LDC4600	LT4600T	4TA603LDK ③

## Types LD, HLD and LDC Thermal-Magnetic Circuit Breakers—Frame Only

Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac Catalog Number	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac Catalog Number	Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac Catalog Number
<b>Two-Pole</b>		
LD2600F	HLD2600F	LDC2600F
<b>Three-Pole</b>		
LD3600F	HLD3600F	LDC3600F
<b>Four-Pole</b>		
LD4600F	HLD4600F	LDC4600F

## Notes

- ① Magnetic trip range 5–10 times continuous ampere rating.
- ② Individually packed.
- ③ Terminal kits contain one terminal for each pole and one terminal cover.
- ④ Neutral is in right pole.

# 2.3

## Molded Case Circuit Breakers

### Series C

#### Types LD, HLD and LDC Electronic Circuit Breakers with Interchangeable Trip Units

Order as individual components: breaker frame, trip unit, rating plug, terminals.

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#### Types LD, HLD and LDC Electronic Circuit Breakers with Interchangeable Trip Units

Maximum Continuous Ampere Rating at 40°C ①	Circuit Breaker Frame Only			Digitrip RMS 310 Trip Unit Only ②				Digitrip RMS 310 Rating Plug Only			Standard Terminals Only
	Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac Catalog Number	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac Catalog Number	Ultra High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac	L – Adjustable Long Delay Pickup (By Adjustable Rating Plug)	S – Adjustable Short Delay Pickup with Fixed Short Delay Time (I <sup>2</sup> t Response) or Adjustable Short Delay Time (Flat Response)	I – Adjustable Instantaneous Pickup by Setting Short Delay Time to Instantaneous	G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Delay (Flat Response)	Ampere Rating	Fixed Rating Plug Catalog Number	Adjustable Rating Plug Ampere Rating	
<b>Three-Pole ③</b>											
600	LD3600F	HLD3600F	LDC3600F	LES3600LS	LES3600LSI	LES3600LSG	LES3600LSIG	300	6LES300T	300/400/ 500/600	TA602LD ④
								350	6LES350T	A6LES600T1	TA602LD ④
								400	6LES400T	420/440/ 460/480	TA602LD ④
								450	6LES450T	A6LES400T5	TA602LD ④
								500	6LES500T	520/540/ 560/580	3TA603LDK ④
								600	6LES600T	A6LES500T5	
<b>Four-Pole ③</b>											
600	LD4600F	HLD4600F	LDC4600F	LES4600LS	LES4600LSI	—	—	300	6LES300T	300/400/ 500/600	TA602LD ④
								350	6LES350T	A6LES600T1	TA602LD ④
								400	6LES400T	420/440/ 460/480	TA602LD ④
								450	6LES450T	A6LES400T5	TA602LD ④
								500	6LES500T	520/540/ 560/580	4TA603LDK ④
								600	6LES600T	A6LES500T5	

#### Notes

- ① Individually packed.
- ② For AC use only.
- ③ Neutral is in right pole.
- ④ Terminal kits contain one terminal for each pole and one terminal cover.

**Types LDB, HLDB and LDCB Electronic Circuit Breakers with Non-Interchangeable Electronic Trip Units Suitable for Reverse Feed**

Maximum Continuous Ampere Rating at 40°C	Number of Poles	Circuit Breaker Frame Including Digitrip RMS 310 Electronic Trip Unit Less Terminals and Rating Plug—Catalog Number				Digitrip RMS 310 Rating Plug (Order as Separate Items)	
		LS	LSI	LSG	LSIG	Fixed	Adjustable
Short Time Range		2–8 x I <sub>n</sub>	2–8 x I <sub>n</sub>	2–8 x I <sub>n</sub>	2–8 x I <sub>n</sub>		
Short Time Delay		—	1–300 ms	—	0–300 ms		
Ground Fault Pickup		—	—	Varies by frame	Varies by frame		
Ground Fault Delay		—	—	0–500 ms	0–500 ms	Catalog Number	
<b>Type LDB, HLDB and LDCB with Digitrip 310 Non-Interchangeable Trip Unit</b>							
600	3	LDB3600FT33W	LDB3600FT32W	LDB3600FT35W	LDB3600FT35W	6LES300T	300/400/500/600
						6LES350T	A6LES600T1
						6LES400T	420/440/460/480
						6LES450T	A6LES400T5
						6LES500T	520/540/560/580
6LES600T	A6LES500T5						
600	3	HLDB3600FT33W	HLDB3600FT32W	HLDB3600FT35W	HLDB3600FT36W	6LES300T	300/400/500/600
						6LES350T	A6LES600T1
						6LES400T	420/440/460/480
						6LES450T	A6LES400T5
						6LES500T	520/540/560/580
6LES600T	A6LES500T5						
600	3	LDCB3600FT33W	LDCB3600FT32W	LDCB3600FT35W	LDCB3600FT36W	6LES300T	300/400/500/600
						6LES350T	A6LES600T1
						6LES400T	420/440/460/480
						6LES450T	A6LES400T5
						6LES500T	520/540/560/580
6LES600T	A6LES500T5						

# 2.3

## Molded Case Circuit Breakers

### Series C

2

#### 100% Rated Types CLD, CHLD and CLDC Electronic Circuit Breakers with Interchangeable Trip Units

The NEC allows the breaker to be rated at 100% of its frame size in an assembly, provided that 90°C wire is applied at the 75°C ampacity. All 100% rated circuit breakers have electronic trip units. Order as individual components: breaker frame, trip unit, rating plug and terminals.

#### 100% Rated Types CLD, CHLD and CLDC Electronic Circuit Breakers with Interchangeable Trip Units

Maximum Continuous Ampere Rating at 40°C ①	Circuit Breaker Frame Only			Digitrip RMS 310 Trip Unit Only			Digitrip RMS 310 Rating Plug Only			Standard Terminals Only	
	Standard Interrupting Capacity	High Interrupting Capacity	Ultra High Interrupting Capacity	Standard	Options	Options	Options	Options	Adjustable Rating Plug		
	600 Vac Rated 35 kAIC at 480 Vac Catalog Number	600 Vac Rated 65 kAIC at 480 Vac Catalog Number	600 Vac Rated 100 kAIC at 480 Vac Catalog Number	Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay Ramp	Independently Adjustable Short Time Pickup and Ground Fault Protection	Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay and Ground Fault Protection	Independently Adjustable Short Time Pickup and Ground Fault Protection	Independently Adjustable Short Time Pickup and Ground Fault Protection	Fixed Rating Plug Ampere Rating Catalog Number		
<b>Three-Pole</b>											
600	CLD3600F	CHLD3600F	CLDC3600F	LES3600LS	LES3600LSI	LES3600LSG	LES3600LSIG	300	6LES300T	300/400/500/600	TA602LD ②
								350	6LES350T	A6LES600T1	TA602LD ②
								400	6LES400T	420/440/460/480	TA602LD ②
								450	6LES450T	A6LES400T5	TA602LD ②
								500	6LES500T	520/540/560/580	3TA603LDK ③
								600	6LES600T	A6LES500T5	3TA603LDK ③

#### Notes

- ① Ampere rating is established by rating plug.
- ② Individually packed.
- ③ 3TA603LDK terminal kit contains one terminal for each pole and one terminal cover.

### Type LDB Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units <sup>①</sup>

Maximum Continuous Ampere Rating	600 Vac Rated, 250 Vdc Complete Circuit Breaker	
	Without Line and Load Terminals Catalog Number	With Standard Line and Load Terminals Only Catalog Number
<b>Two-Pole</b>		
300	LDB2300W	LDB2300
350	LDB2350W	LDB2350
400	LDB2400W	LDB2400
450	LDB2450W	LDB2450
500	LDB2500W	LDB2500
600	LDB2600W	LDB2600
<b>Three-Pole</b>		
300	LDB3300W	LDB3300
350	LDB3350W	LDB3350
400	LDB3400W	LDB3400
450	LDB3450W	LDB3450
500	LDB3500W	LDB3500
600	LDB3600W	LDB3600

### Molded Case Switches

Eaton's molded case switches are used as compact switches in applications requiring high current switching capabilities. Molded case switches are constructed of circuit breaker

components and are of the high instantaneous automatic type. Molded case switches are listed in accordance with Underwriters Laboratories Standard UL 489.

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### Molded Case Switches

Maximum Continuous Ampere Rating at 40°C	600 Vac Maximum, 250 Vdc Circuit Breaker Only without Line and Load Terminals	
	Catalog Number	Standard Terminals Only See Page V4-T2-198 for Optional Terminals Catalog Number
<b>Two-Pole</b>		
600	LD2600WK	2TA603LDK
600	LDB2600WK <sup>①</sup>	2TA603LDK
600	HLD2600WK	2TA603LDK
<b>Three-Pole</b>		
600	LD3600WK	3TA603LDK
600	LDB3600WK <sup>①</sup>	3TA603LDK
600	HLD3600WK	3TA603LDK
<b>Four-Pole</b>		
600	LD4600WK	4TA603LDK
600	LDB4600WK <sup>①</sup>	4TA603LDK
600	HLD4600WK	4TA603LDK

#### Notes

- <sup>①</sup> Factory sealed—suitable for reverse feed application.  
Molded case switch will trip above 6000 amperes.



# 2.3

## Molded Case Circuit Breakers

### Series C

#### Digitrip OPTIM Electronic Circuit Breaker with Interchangeable Rating Plug

Order as individual components: Breaker Frame (which includes Trip Unit), Rating Plug, Terminals.

2

#### Digitrip OPTIM 550 Electronic Circuit Breaker with Interchangeable Rating Plug

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only			Digitrip OPTIM Rating Plug Only	
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
L – Adjustable Long Delay Pickup (I <sub>1</sub> ) with Adjustable Long Delay Time (I <sup>2</sup> t or I <sup>4</sup> t Response) <sup>①</sup> S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I <sup>2</sup> t or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time (I <sup>2</sup> t or Flat Response) A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time (I <sup>2</sup> t or Flat Response) OPTIM 550 <sup>②</sup>					
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac</b>					
125	LD3125T52W	LD3125T56W	LD3125T57W	—	ORPL125A070
				—	ORPL125A090
				—	ORPL125A100
				—	ORPL125A110
				—	ORPL125A125
250	LD3250T52W	LD3250T56W	LD3250T57W	—	ORPL025A125
				—	ORPL025A150
				—	ORPL025A175
				—	ORPL025A200
				—	ORPL025A225
400	LD3400T52W	LD3400T56W	LD3400T57W	200	ORPL40A200
				225	ORPL40A225
				250	ORPL40A250
				300	ORPL40A300
				350	ORPL40A350
600	LD3600T52W	LD3600T56W	LD3600T57W	400	ORPL40A400
				300	ORPL60A300
				350	ORPL60A350
				400	ORPL60A400
				500	ORPL60A500
600	ORPL60A600				

#### Notes

① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.

② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.

Digitrip OPTIM 550 Electronic Circuit Breaker with Interchangeable Rating Plug, continued

Circuit Breaker Frame Only

- L – Adjustable Long Delay Pickup (I<sub>2</sub>) with Adjustable Long Delay Time (I<sup>2</sup>t or I<sup>4</sup>t Response) <sup>①</sup>
- S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I<sup>2</sup>t or Flat Response)
- I – Adjustable Instantaneous Pickup
- G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time (I<sup>2</sup>t or Flat Response)
- A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time (I<sup>2</sup>t or Flat Response)

Digitrip OPTIM Rating Plug Only

Maximum  
Continuous  
Ampere  
Rating  
at 40°C

OPTIM 550 <sup>②</sup>

LSI  
Catalog  
Number

LSIG  
Catalog  
Number

LSIA  
Catalog  
Number

Ampere  
Rating

Fixed Rating Plug  
Catalog  
Number

Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac

Maximum Continuous Ampere Rating at 40°C	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
125	HLD3125T52W	HLD3125T56W	HLD3125T57W	70	ORPL125A070
				90	ORPL125A090
				100	ORPL125A100
				110	ORPL125A110
				125	ORPL125A125
250	HLD3250T52W	HLD3250T56W	HLD3250T57W	125	ORPL025A125
				150	ORPL025A150
				175	ORPL025A175
				200	ORPL025A200
				225	ORPL025A225
				250	ORPL025A250
400	HLD3400T52W	HLD3400T56W	HLD3400T57W	200	ORPL40A200
				225	ORPL40A225
				250	ORPL40A250
				300	ORPL40A300
				350	ORPL40A350
				400	ORPL40A400
600	HLD3600T52W	HLD3600T56W	HLD3600T57W	300	ORPL60A300
				350	ORPL60A350
				400	ORPL60A400
				500	ORPL60A500
				600	ORPL60A600

Notes

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.
- ② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.

# 2.3

## Molded Case Circuit Breakers

### Series C

2

#### Digitrip OPTIM 550 Electronic Circuit Breaker with Interchangeable Rating Plug, continued

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only			Digitrip OPTIM Rating Plug Only	
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
L – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time ( $I^2t$ or $I^4t$ Response) <sup>①</sup> S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$ or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time ( $I^2t$ or Flat Response) A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time ( $I^2t$ or Flat Response) OPTIM 550 <sup>②</sup>					
<b>Three-Pole Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac</b>					
125	LDC3125T52W	LDC3125T56W	LDC3125T57W	—	ORPL125A070
				—	ORPL125A090
				—	ORPL125A100
				—	ORPL125A110
				—	ORPL125A125
250	LDC3250T52W	LDC3250T56W	LDC3250T57W	—	ORPL025A125
				—	ORPL025A150
				—	ORPL025A175
				—	ORPL025A200
				—	ORPL025A225
400	LDC3400T52W	LDC3400T56W	LDC3400T57W	200	ORPL40A200
				225	ORPL40A225
				250	ORPL40A250
				300	ORPL40A300
				350	ORPL40A350
600	LDC3600T52W	LDC3600T56W	LDC3600T57W	400	ORPL40A400
				300	ORPL60A300
				350	ORPL60A350
				400	ORPL60A400
				500	ORPL60A500
600	ORPL60A600				

**Notes**

① Long delay  $I^4t$  response selection limits short delay time to flat response.

② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.

**Digitrip OPTIM Electronic Circuit Breaker with Interchangeable Rating Plug**

Order as individual components: Breaker Frame (which includes Trip Unit), Rating Plug, Terminals.

**Digitrip OPTIM 1050 Electronic Circuit Breaker with Interchangeable Rating Plug**

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only		Digitrip OPTIM Rating Plug Only	
	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac</b>				
125	LD3125T106W	LD3125T107W	70	ORPL125A070
			90	ORPL125A090
			100	ORPL125A100
			110	ORPL125A110
			125	ORPL125A125
250	LD3250T106W	LD3250T107W	125	ORPL025A125
			150	ORPL025A150
			175	ORPL025A175
			200	ORPL025A200
			225	ORPL025A225
400	LD3400T106W	LD3400T107W	200	ORPL40A200
			225	ORPL40A225
			250	ORPL40A250
			300	ORPL40A300
			350	ORPL40A350
600	LD3600T106W	LD3600T107W	400	ORPL40A400
			300	ORPL60A300
			350	ORPL60A350
			400	ORPL60A400
			500	ORPL60A500
			600	ORPL60A600

**Notes**

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.
- ② One Form C auxiliary switch and one Form C bell alarm switch supplied with breaker as standard.
- ③ Factory sealed.

#### Digitrip OPTIM 1050 Electronic Circuit Breaker with Interchangeable Rating Plug, continued

**Circuit Breaker Frame Only**

- L – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time ( $I^2t$  or  $I^4t$  Response) ①
- S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$  or Flat Response)
- I – Adjustable Instantaneous Pickup
- G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time ( $I^2t$  or Flat Response)
- A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time ( $I^2t$  or Flat Response)

**Digitrip OPTIM Rating Plug Only**

Maximum Continuous Ampere Rating at 40°C	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>				
125	HLD3125T106W	HLD3125T107W	70	ORPL125A070
			90	ORPL125A090
			100	ORPL125A100
			110	ORPL125A110
			125	ORPL125A125
250	HLD3250T106W	HLD3250T107W	125	ORPL025A125
			150	ORPL025A150
			175	ORPL025A175
			200	ORPL025A200
			225	ORPL025A225
			250	ORPL025A250
			400	HLD3400T106W
225	ORPL40A225			
250	ORPL40A250			
300	ORPL40A300			
350	ORPL40A350			
400	ORPL40A400			
600	HLD3600T106W	HLD3600T107W		
			350	ORPL60A350
			400	ORPL60A400
			500	ORPL60A500
			500	ORPL60A500
			600	ORPL60A600

**Notes**

- ① Long delay  $I^4t$  response selection limits short delay time to flat response.
- ② One Form C auxiliary switch and one Form C bell alarm switch supplied with breaker as standard.
- ③ Factory sealed.

**Digitrip OPTIM 1050 Electronic Circuit Breaker with Interchangeable Rating Plug, continued**

**Circuit Breaker Frame Only**

- L – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time ( $I^2t$  or  $I^4t$  Response) ①
- S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$  or Flat Response)
- I – Adjustable Instantaneous Pickup
- G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time ( $I^2t$  or Flat Response)
- A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time ( $I^2t$  or Flat Response)

**Digitrip OPTIM Rating Plug Only**

Maximum  
Continuous  
Ampere  
Rating  
at 40°C

OPTIM 1050 ②③

LSIG

Catalog  
Number

LSIA

Catalog  
Number

Ampere  
Rating

Fixed Rating Plug

Catalog  
Number

**Three-Pole Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac**

Maximum Continuous Ampere Rating at 40°C	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
125	LDC3125T106W	LDC3125T107W	70	ORPL125A070
			90	ORPL125A090
			100	ORPL125A100
			110	ORPL125A110
			125	ORPL125A125
250	LDC3250T106W	LDC3250T107W	125	ORPL025A125
			150	ORPL025A150
			175	ORPL025A175
			200	ORPL025A200
			225	ORPL025A225
			250	ORPL025A250
400	LDC3400T106W	LDC3400T107W	200	ORPL40A200
			225	ORPL40A225
			250	ORPL40A250
			300	ORPL40A300
			350	ORPL40A350
			400	ORPL40A400
600	LDC3600T106W	LDC3600T107W	300	ORPL60A300
			350	ORPL60A350
			400	ORPL60A400
			500	ORPL60A500
			600	ORPL60A600

**Notes**

- ① Long delay  $I^4t$  response selection limits short delay time to flat response.
- ② One Form C auxiliary switch and one Form C bell alarm switch supplied with breaker as standard.
- ③ Factory sealed.

# 2.3

## Molded Case Circuit Breakers

### Series C

#### 100% Rated Digitrip OPTIM Circuit Breakers with Interchangeable Rating Plug

Order as individual components: Breaker Frame (which includes Trip Unit), Rating Plug, Terminals.

2

#### 100% Rated Digitrip OPTIM 550 Circuit Breakers with Interchangeable Rating Plug

##### Circuit Breaker Frame Only

- L – Adjustable Long Delay Pickup ( $I_1$ ) with Adjustable Long Delay Time ( $I^2t$  or  $I^4t$  Response) ①
- S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$  or Flat Response)
- I – Adjustable Instantaneous Pickup
- G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time ( $I^2t$  or Flat Response)
- A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time ( $I^2t$  or Flat Response)

##### OPTIM 550 ②

##### Digitrip OPTIM Rating Plug Only

Maximum Continuous Ampere Rating at 40°C	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac</b>					
125	CLD3125T52W	CLD3125T56W	CLD3125T57W	70	ORPL125A070
				90	ORPL125A090
				100	ORPL125A100
				110	ORPL125A110
				125	ORPL125A125
250	CLD3250T52W	CLD3250T56W	CLD3250T57W	125	ORPL025A125
				150	ORPL025A150
				175	ORPL025A175
				200	ORPL025A200
				225	ORPL025A225
400	CLD3400T52W	CLD3400T56W	CLD3400T57W	200	ORPL40A200
				225	ORPL40A225
				250	ORPL40A250
				300	ORPL40A300
				350	ORPL40A350
600	CLD3600T52W	CLD3600T56W	CLD3600T57W	400	ORPL40A400
				300	ORPL60A300
				350	ORPL60A350
				400	ORPL60A400
				500	ORPL60A500
				600	ORPL60A600

#### Notes

① Long delay  $I^4t$  response selection limits short delay time to flat response.

② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.

100% Rated Digitrip OPTIM 550 Circuit Breakers with Interchangeable Rating Plug, continued

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only			Digitrip OPTIM Rating Plug Only	
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
L – Adjustable Long Delay Pickup (I <sub>r</sub> ) with Adjustable Long Delay Time (I <sup>2</sup> t or I <sup>4</sup> t Response) ① S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I <sup>2</sup> t or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time (I <sup>2</sup> t or Flat Response) A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time (I <sup>2</sup> t or Flat Response) OPTIM 550 ②					
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>					
125	CHLD3125T52W	CHLD3125T56W	CHLD3125T57W	70	ORPL125A070
				90	ORPL125A090
				100	ORPL125A100
				110	ORPL125A125
				125	ORPL125A125
250	CHLD3250T52W	CHLD3250T56W	CHLD3125T57W	125	ORPL025A125
				150	ORPL025A150
				175	ORPL025A175
				200	ORPL025A200
				225	ORPL025A225
				250	ORPL025A250
400	CHLD3400T52W	CHLD3400T56W	CHLD3400T57W	200	ORPL40A200
				225	ORPL40A225
				250	ORPL40A250
				350	ORPL40A350
				400	ORPL40A400
600	CHLD3600T52W	CHLD3600T56W	CHLD3600T57W	300	ORPL60A300
				350	ORPL60A350
				400	ORPL60A400
				500	ORPL60A500
				600	ORPL60A600

Notes

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.
- ② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.



# 2.3

## Molded Case Circuit Breakers

### Series C

2

#### 100% Rated Digitrip OPTIM 550 Circuit Breakers with Interchangeable Rating Plug, continued

**Circuit Breaker Frame Only**

- L – Adjustable Long Delay Pickup (I<sub>1</sub>) with Adjustable Long Delay Time (I<sup>2</sup>t or I<sup>4</sup>t Response) ①
- S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I<sup>2</sup>t or Flat Response)
- I – Adjustable Instantaneous Pickup
- G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time (I<sup>2</sup>t or Flat Response)
- A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time (I<sup>2</sup>t or Flat Response)

**OPTIM 550 ②**

**Digitrip OPTIM Rating Plug Only**

Maximum Continuous Ampere Rating at 40°C	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac</b>					
125	CLDC3125T52W	CLDC3125T56W	CLDC3125T57W	70	ORPL125A070
				90	ORPL125A090
				100	ORPL125A100
				110	ORPL125A110
				125	ORPL125A125
250	CLDC3250T52W	CLDC3250T56W	CLDC3125T57W	125	ORPL025A125
				150	ORPL025A150
				175	ORPL025A175
				200	ORPL025A200
				225	ORPL025A225
				250	ORPL025A250
400	CLDC3400T52W	CLDC3400T56W	CLDC3400T57W	200	ORPL40A200
				225	ORPL40A225
				250	ORPL40A250
				300	ORPL40A300
				350	ORPL40A350
				400	ORPL40A400
600	CLDC3600T52W	CLDC3600T56W	CLDC3600T57W	300	ORPL60A300
				350	ORPL60A350
				400	ORPL60A400
				500	ORPL60A500
				600	ORPL60A600

**Notes**

① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.

② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.

**100% Rated Digitrip OPTIM 1050 Circuit Breakers with Interchangeable Rating Plug**

**Circuit Breaker Frame Only**

- L – Adjustable Long Delay Pickup (I<sub>1</sub>) with Adjustable Long Delay Time (I<sup>2</sup>t or I<sup>4</sup>t Response) ①
- S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I<sup>2</sup>t or Flat Response)
- I – Adjustable Instantaneous Pickup
- G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time (I<sup>2</sup>t or Flat Response)
- A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time (I<sup>2</sup>t or Flat Response)

**Digitrip OPTIM Rating Plug Only**

Maximum Continuous Ampere Rating at 40°C	OPTIM 1050 ②③		Ampere Rating	Fixed Rating Plug Catalog Number
	LSIG Catalog Number	LSIA Catalog Number		
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac</b>				
125	CLD3125T106W	CLD3125T107W	70	ORPL125A070
			90	ORPL125A090
			100	ORPL125A100
			110	ORPL125A110
			125	ORPL125A125
250	CLD3250T106W	CLD3250T107W	125	ORPL025A125
			150	ORPL025A150
			175	ORPL025A175
			200	ORPL025A200
			225	ORPL025A225
			250	ORPL025A250
400	CLD3400T106W	CLD3400T107W	200	ORPL40A200
			225	ORPL40A225
			250	ORPL40A250
			300	ORPL40A300
			350	ORPL40A350
			400	ORPL40A400
			600	CLD3600T106W
350	ORPL60A350			
400	ORPL60A400			
500	ORPL60A500			
500	ORPL60A500			
600	ORPL60A600			

**Notes**

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.
- ② One Form C auxiliary switch and one Form C bell alarm switch supplied with breaker as standard.
- ③ Factory sealed.

# 2.3

## Molded Case Circuit Breakers

### Series C

2

#### 100% Rated Digitrip OPTIM 1050 Circuit Breakers with Interchangeable Rating Plug, continued

**Circuit Breaker Frame Only**

- L – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time ( $I^2t$  or  $I^4t$  Response) <sup>①</sup>
- S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$  or Flat Response)
- I – Adjustable Instantaneous Pickup
- G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time ( $I^2t$  or Flat Response)
- A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time ( $I^2t$  or Flat Response)

**Digitrip OPTIM Rating Plug Only**

**OPTIM 1050 <sup>②③</sup>**

Maximum Continuous Ampere Rating at 40°C	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>				
125	CHLD3125T106W	CHLD3125T107W	70	ORPL125A070
			90	ORPL125A090
			100	ORPL125A100
			110	ORPL125A110
			125	ORPL125A125
250	CHLD3250T106W	CHLD3250T107W	125	ORPL025A125
			150	ORPL025A150
			175	ORPL025A175
			200	ORPL025A200
			225	ORPL025A225
			250	ORPL025A250
400	CHLD3400T106W	CHLD3400T107W	200	ORPL40A200
			225	ORPL40A225
			250	ORPL40A250
			300	ORPL40A300
			350	ORPL40A350
			400	ORPL40A400
600	CHLD3600T106W	CHLD3600T107W	300	ORPL60A300
			350	ORPL60A350
			400	ORPL60A400
			500	ORPL60A500
			500	ORPL60A500
			600	ORPL60A600

**Notes**

- ① Long delay  $I^4t$  response selection limits short delay time to flat response.
- ② One Form C auxiliary switch and one Form C bell alarm switch supplied with breaker as standard.
- ③ Factory sealed.

100% Rated Digitrip OPTIM 1050 Electronic Circuit Breaker with Interchangeable Rating Plug, continued

Circuit Breaker Frame Only

- L – Adjustable Long Delay Pickup (I<sub>1</sub>) with Adjustable Long Delay Time (I<sup>2</sup>t or I<sup>4</sup>t Response) ①
- S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I<sup>2</sup>t or Flat Response)
- I – Adjustable Instantaneous Pickup
- G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time (I<sup>2</sup>t or Flat Response)
- A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time (I<sup>2</sup>t or Flat Response)

Digitrip OPTIM Rating Plug Only

Maximum Continuous Ampere Rating at 40°C	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac</b>				
125	CLDC3125T106W	CLDC3125T107W	70	ORPL125A070
			90	ORPL125A090
			100	ORPL125A100
			110	ORPL125A110
			125	ORPL125A125
250	CLDC3250T106W	CLDC3250T107W	125	ORPL025A125
			150	ORPL025A150
			175	ORPL025A175
			200	ORPL025A200
			225	ORPL025A225
			250	ORPL025A250
400	CLDC3400T106W	CLDC3400T107W	200	ORPL40A200
			225	ORPL40A225
			250	ORPL40A250
			300	ORPL40A300
			350	ORPL40A350
			400	ORPL40A400
600	CLDC3600T106W	CLDC3600T107W	300	ORPL60A300
			350	ORPL60A350
			400	ORPL60A400
			500	ORPL60A500
			600	ORPL60A600

Notes

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.
- ② One Form C auxiliary switch and one Form C bell alarm switch supplied with breaker as standard.
- ③ Factory sealed.

### Accessories Selection Guide and Ordering Information

#### Line and Load Terminals

Eaton's line and load terminals provide wire connecting capabilities for specific ranges of continuous current ratings and wire types. All terminals comply with Underwriters Laboratories Standards UL 486A and UL 486B and CSA Standard C22.2 No. 65M. Unless otherwise specified,

L-Frame circuit breaker line and load terminals are shipped separately for field installation.

The wire connecting terminal is secured with two pan-head, slotted screws and lockwashers that can be checked for the correct torque loading or retightened from the front of the circuit

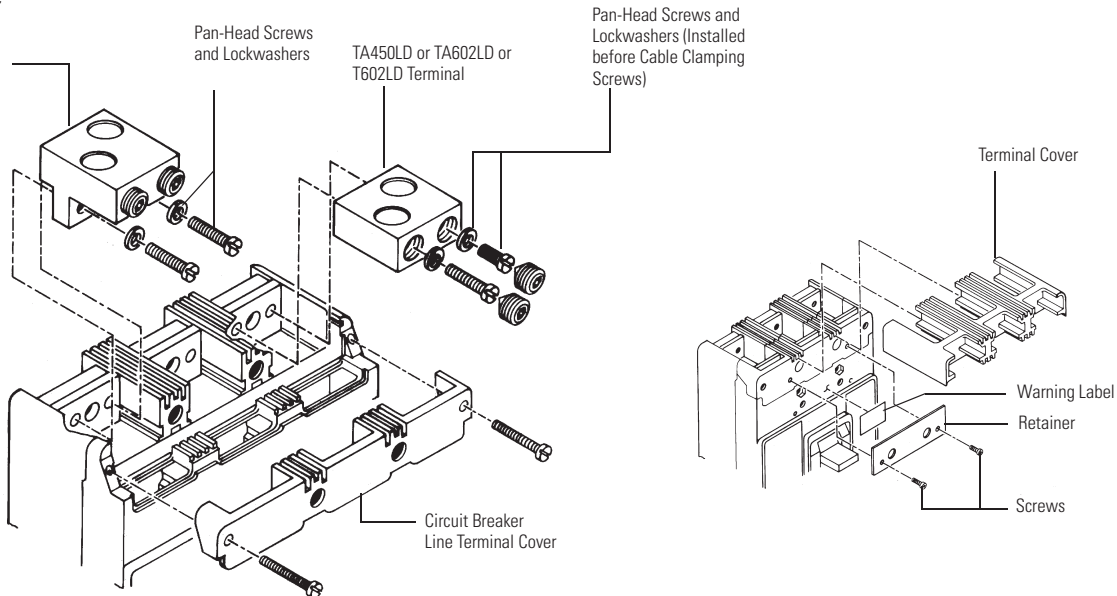
breaker before installation of the conductors. (Applies to all styles.) The circuit breaker line/load terminal conductors are positioned in the conducting holes in the wire connecting terminal and are secured with recessed socket screws that are tightened to the correct torque loading from the front of the circuit breaker.

#### Ordering Information

L-Frame circuit breakers use Cu/Al terminals as standard. When optional copper terminals are required, order by catalog Number. Specify if factory installation is required.

#### Terminals

TA401LD or TA603LD Terminal (Step-Type Terminal Requires Terminal Cover and Warning Label. See Inset.)



#### Line and Load Terminals

Maximum Breaker Amperes	Terminal Body Material	Wire Type	AWG Wire Range/Number of Conductors	Metric Wire Range mm <sup>2</sup>	Terminal Poles	Catalog Number	Terminals with Control Wire Termination Catalog Number
<b>Standard Cu/Al Pressure Terminals</b>							
400	Aluminum	Cu/Al	4/0–600 (1)	120–300	Two-pole kit ①	2TA401LDK	—
400	Aluminum	Cu/Al	4/0–600 (1)	120–300	Three-pole kit ①	3TA401LDK	—
400	Aluminum	Cu/Al	4/0–600 (1)	120–300	Four-pole kit ①	4TA401LDK	—
450	Aluminum	Cu/Al	4–4/0 (2)	25–95	②	TA450LD	—
500	Aluminum	Cu/Al	3/0–350 (2)	95–150	②	TA602LD	TA602LDCW
600	Aluminum	Cu/Al	400–500 (2)	185–240	Two-pole kit ①	2TA603LDK	2TA603LDKCW
600	Aluminum	Cu/Al	400–500 (2)	185–240	Three-pole kit ①	3TA603LDK	3TA603LDKCW
600	Aluminum	Cu/Al	400–500 (2)	185–240	Four-pole kit ①	4TA603LDK	4TA603LDKCW
<b>Optional Copper and Cu/Al Pressure Type Terminals</b>							
600	Copper	Cu	250–350 (2)	120–250	②	T602LD	T602LDCW

#### Notes

- ① Terminal kits contain one terminal for each pole and one terminal cover.
- ② Individually packed.

## Accessories

### Allowable Accessory Combinations

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

### LD Frame Accessories

Description	Reference Page	Two-Pole <sup>①</sup> , Three-Pole			Four-Pole			Neutral <sup>②</sup>
		Left	Center	Right	Left	Center	Right	
<b>Internal Accessories (Only One Internal Accessory Per Pole) <sup>③</sup></b>								
Alarm lockout (Make/Break)	V4-T2-271	■		■	■		■	
Alarm lockout (2Make/2Break)	V4-T2-271	■		■	■		■	
Auxiliary switch (1A, 1B)	V4-T2-273	■		■	■		■	
Auxiliary switch (2A, 2B)	V4-T2-273	■		■	■		■	
Auxiliary switch (3A, 3B)	V4-T2-273	■		■	■		■	
Auxiliary switch (1A, 1B) and alarm switch combination	V4-T2-275	■		■	■		■	
Auxiliary switch (2A, 2B) and alarm switch combination	V4-T2-275	■		■	■		■	
Shunt trip—standard <sup>④</sup>	V4-T2-277	■		■	■		■	
Shunt trip—low energy <sup>④</sup>	V4-T2-280	■		■	■		■	
Undervoltage release mechanism <sup>④</sup>	V4-T2-286	■		■	■		■	
Eaton PowerNet communications kit (OPTIM 550)	V4-T2-288			■				
<b>External Accessories</b>								
End cap kit	V4-T2-303	●	●	●	●	●	●	●
Control wire terminal kit	V4-T2-304	●	●	●	●	●	●	●
Base mounting hardware	V4-T2-306	●	●	●	●	●	●	●
Terminal shields	V4-T2-308	●	●	●	●	●	●	●
Interphase barriers	V4-T2-308	●	●	●	●	●	●	●
Non-padlockable handle block	V4-T2-309		■			■		
Padlockable handle lock hasp	V4-T2-310	□		□	□		□	
Key interlock kit	V4-T2-311	□		□	□		□	
Sliding bar interlock—requires two breakers	V4-T2-312	●	●	●				
Walking beam interlock—requires two breakers	V4-T2-312	●	●	●	●	●	●	●
Electrical (motor) operator	V4-T2-313	●	●	●	●	●	●	●
Plug-in adapters	V4-T2-315	●	●	●	●	●	●	●
Rear connecting studs	V4-T2-316	●	●	●	●	●	●	●
Panelboard connecting straps	V4-T2-317	●	●	●	●	●	●	●
Handle mechanisms	V4-T2-419	●	●	●	●	●	●	●
Handle extension	V4-T2-434	●	●	●	●	●	●	●
Solid-state (electronic) portable test kit	V4-T2-319	●	●	●	●	●	●	●

#### Legend

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

#### Notes

- ① Two-pole breaker supplied in three-pole frame. Current carrying parts omitted from center pole.
- ② Refer to Eaton for appropriate neutral pole accessory combinations.
- ③ OPTIM model 1050 is factory sealed and does not have the right pole space available for accessories.
- ④ Shunt trip and UVR cannot be mounted in right poles on LES or OPTIM trip units. Standard non-tripping internal accessories can be mounted in the left or right poles of LES and 550 OPTIM trip units.

#### LD Frame Accessories, continued

2

Description	Reference Page	Two-Pole <sup>①</sup> , Three-Pole			Four-Pole			Neutral <sup>②</sup>
		Left	Center	Right	Left	Center	Right	
<b>OPTIM System Components Three Poles</b>								
Ground fault alarm unit	V4-T2-319							
Potential transformer module	V4-T2-319							
Breaker interface module (BIM)	V4-T2-320							
Digitrip OPTIMizer	V4-T2-320							
Auxiliary power module	V4-T2-320							
<b>Modifications (Refer to Eaton)</b>								
Special calibration	—	●	●	●	●	●	●	●
Moisture fungus treatment	V4-T2-110	●	●	●	●	●	●	●
Freeze-tested circuit breakers	—	●	●	●	●	●	●	●
Marine/naval application	—	●	●	●	●	●	●	●

#### Legend

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

#### Notes

- ① Two-pole breaker supplied in three-pole frame. Current carrying parts omitted from center pole.
- ② Refer to Eaton for appropriate neutral pole accessory combinations.

## Technical Data and Specifications

### UL 489 Interrupting Capacity Ratings <sup>①</sup>

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA rms Symmetrical Amperes)					
		Volts AC (50/60 Hz)				Volts DC	
		240	277	480	600	125	250 <sup>②③</sup>
LDB	2, 3	65	—	35	25	—	22
LD	2, 3, 4	65	—	35	25	—	22
CLD <sup>④</sup>	2, 3, 4	65	—	35	25	—	—
HLD, HLDB	2, 3, 4	100	—	65	35	—	25
CHLD <sup>④</sup>	2, 3, 4	100	—	65	35	—	—
LDC, LDCB <sup>⑤</sup>	2, 3, 4	200	—	100	50	—	30
CLDC <sup>④⑤</sup>	2, 3, 4	200	—	100	50	—	—

### IEC 947-2 Interrupting Capacity Ratings <sup>①</sup>

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)							
		Volts AC (50/60 Hz)				Volts DC			
		240		415		690		250 <sup>②③</sup>	
		$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$
LDB	2, 3	85	85	45	45	20	10	20	10
LD	2, 3, 4	85	85	45	45	20	10	20	10
CLD <sup>④</sup>	2, 3, 4	85	85	45	45	20	10	—	—
HLD, HLDB	2, 3, 4	100	100	70	70	25	13	20	10
CHLD <sup>④</sup>	2, 3, 4	100	100	70	70	25	13	—	—
LDC, LDCB	2, 3, 4	200	100	100	75	35	18	20	10
CLDC <sup>④</sup>	2, 3, 4	200	100	100	75	35	18	—	—

#### Notes

- ① Utilization Category A circuit breakers.
- ② L/R = 8 milliseconds minimum.
- ③ Two-pole circuit breaker or two poles of three-pole circuit breaker. Incorporating thermal-magnetic trip unit only.
- ④ 100% rated breakers.
- ⑤ Current limiting.



## Specifications

Trip Unit Type	Digitrip RMS 310		Digitrip OPTIM 550	Digitrip OPTIM 1050
rms sensing	Yes	Yes	Yes	Yes
<b>Breaker Type</b>				
Frame	L	L	L	L
Ampere range	300–600A	300–600A	200–600A	200–600A
Interrupting rating at 480 volts	35, 65, 100 (kA)	35, 65, 100 (kA)	35, 65, 100 (kA)	35, 65, 100 (kA)
<b>Protection</b>				
Ordering options	LS, LSG	LSI, LSIG	LSI, LSI(A), LSIG	LSI(A), LSIG
Fixed rated plug ( $I_n$ )	Yes	Yes	Yes	Yes
Overtemperature trip	Yes	Yes	Yes	Yes
<b>Long Delay Protection (L)</b>				
Adjustable rating plug ( $I_n$ )	Yes	Yes	No	No
Long delay pickup	0.5–1.0 ( $I_n$ ) <sup>①</sup>	0.5–1.0 ( $I_n$ ) <sup>①</sup>	0.4–1.0 ( $I_n$ )	0.4–1.0 ( $I_n$ )
Long delay time $I^2t$	12 seconds	12 seconds	2–24 seconds	2–24 seconds
Long delay time $I^4t$	No	No	1–5 seconds	1–5 seconds
Long delay thermal memory	Yes	Yes	Yes	Yes
High load alarm	No	No	0.5–1.0 $x I_r$	0.5–1.0 $x I_r$
<b>Short Delay Protection (S)</b>				
Short delay pickup	200–800% $x (I_n)$	200–800% $x (I_n)$	150–800% $x (I_r)$	150–800% $x (I_r)$
Short delay time $I^2t$	100 ms	No	100–500 ms	100–500 ms
Short delay time flat	No	Inst–300 ms	100–500 ms	100–500 ms
Short delay time zone selective interlocking	No	No	Yes <sup>④</sup>	Yes
<b>Instantaneous Protection (I)</b>				
Instantaneous pickup	No	200–800% $x (I_n)$	200–800% $x (I_n)$	200–800% $x (I_n)$
Discriminator	No	No	Yes	Yes
Instantaneous override	Yes	Yes	Yes	Yes
<b>Ground Fault Protection (G)</b>				
Ground fault alarm	No	No	20–100% $x (I_g)$	20–100% $x (I_g)$
Ground fault pickup	1–5 $x I_g$ (120A)	1–5 $x I_g$ (120A)	20–100% $x (I_g)$	20–100% $x (I_g)$
Ground fault delay $I^2t$	No	No	100–500 ms	100–500 ms
Ground fault delay flat	Inst–500 ms	Inst–500 ms	100–500 ms	100–500 ms
Ground fault zone selective interlocking	No	No	Yes <sup>④</sup>	Yes
Ground fault thermal memory	Yes	Yes	Yes	Yes
<b>System Diagnostics</b>				
Status LEDs	Yes	Yes	Yes	Yes
Cause of trip LEDs	No	No	Yes	Yes
Magnitude of trip information	No	No	Yes	Yes
Remote signal contact—ground alarm	Yes <sup>⑤</sup>	Yes <sup>⑤</sup>	Yes <sup>④</sup>	Yes
Local auxiliary and bell alarm contact	Optional	Optional	Optional	Included

## Legend

BIM = Breaker Interface Module  
(A) = GF Alarm  
 $I_g$  = Sensor Rating  
 $I_n$  = Rating Plug  
 $I_r$  = Long Delay Pickup Setting

## Notes

- ① Adjust by rating plug.
- ② By OPTIMizer/BIM.
- ③ Eaton's PowerNet kit.
- ④ Zone interlock kit.
- ⑤ With separate ground fault alarm unit (GFAU).

## Specifications, continued

Trip Unit Type	Digitrip RMS 310		Digitrip OPTIM 550	Digitrip OPTIM 1050
<b>System Monitoring</b>				
Digital display	No	No	Yes <sup>①</sup>	Yes <sup>①</sup>
Current	No	No	Yes	Yes
Power and energy	No	No	No	Yes
Power quality—harmonics	No	No	No	Yes
Power factor	No	No	No	Yes
<b>Communications</b>				
PowerNet	No	No	Yes <sup>②</sup>	Yes
<b>Testing</b>				
Testing method	Test set	Test set	OPTIMizer, BIM, PowerNet	OPTIMizer, BIM, PowerNet

**Legend**

BIM = Breaker Interface Module  
 (A) = GF Alarm  
 $I_s$  = Sensor Rating  
 $I_n$  = Rating Plug  
 $I_r$  = Long Delay Pickup Setting

**Notes**

- ① By OPTIMizer/BIM.  
 ② Eaton's PowerNet kit.

# 2.3

## Molded Case Circuit Breakers

### Series C

#### Dimensions and Weights

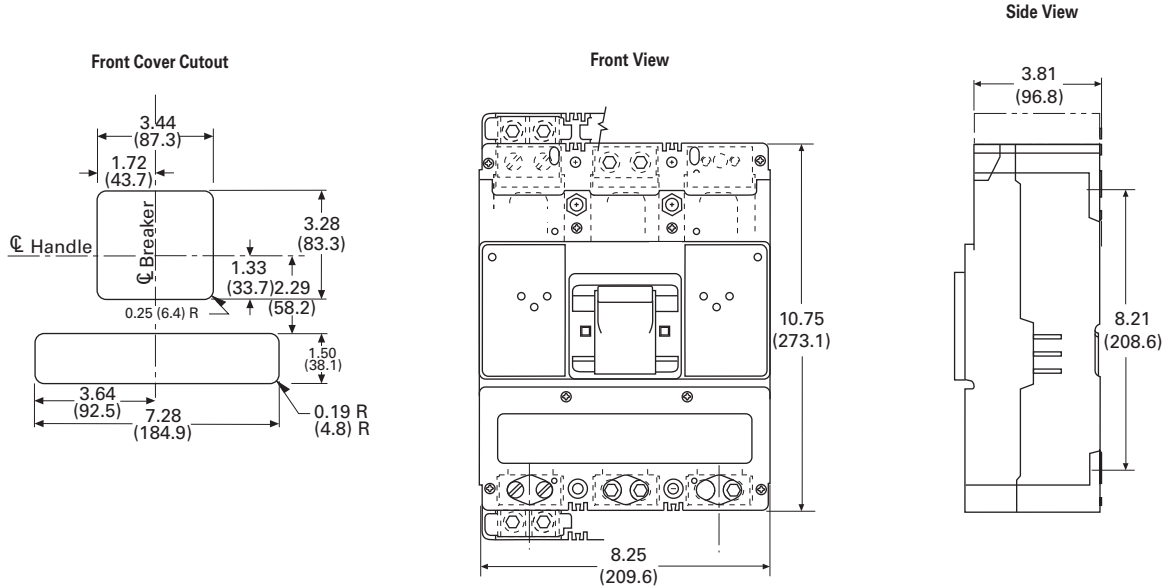
Dimensions in Inches (mm)

2

#### LD Frame

Number of Poles	Width	Height	Depth
2, 3	8.25 (209.6)	10.75 (273.1)	4.06 (103.1)
4	11.00 (279.4)	10.75 (273.1)	4.06 (103.1)

#### LD-Frame, Two- and Three-Pole



Approximate Shipping Weight, Lbs (kg)

#### LD Frame

Breaker Type	Complete Breaker			Frame Only			Trip Unit		
	Two-Pole	Three-Pole	Four-Pole	Two-Pole	Three-Pole	Four-Pole	Two-Pole	Three-Pole	Four-Pole
LD, HLD, LDC	18 (8.2)	20 (9.1)	25 (11.3)	14 (6.4)	15 (6.8)	20 (9.1)	3 (1.4)	4 (1.8)	5 (2.3)
LDB	18 (8.2)	20 (9.1)	25 (11.3)	—	—	—	—	—	—

Typical M-Frame Circuit Breaker



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**M-Frame (300–800 Amperes)**

**Product Description**

- All Eaton M-Frame circuit breakers are HACR rated
- MDL-Frame circuit breakers are available as individual components (frame, trip unit, terminals), or factory assembled complete breakers
- MDLB, HMDLB-Frame circuit breakers with non-interchangeable trip units are suitable for reverse feed use

**Standards and Certifications**

- CE marked



# 2.3

## Molded Case Circuit Breakers

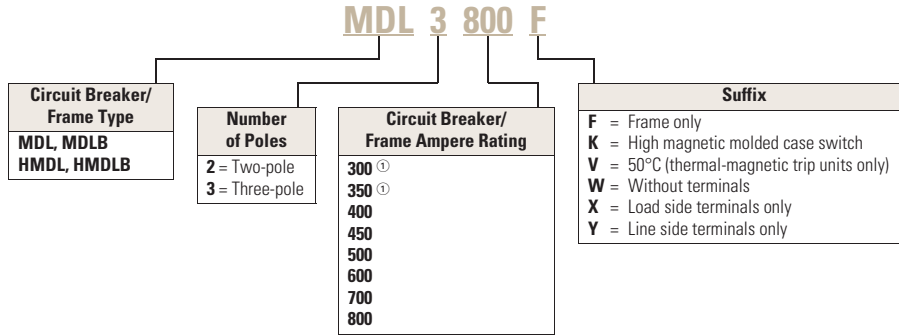
### Series C

#### Catalog Number Selection

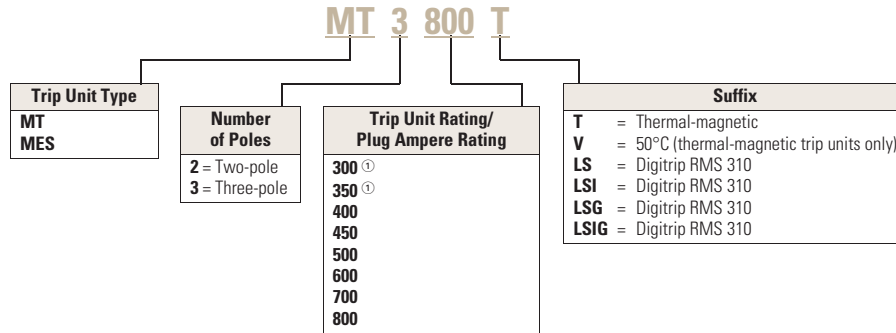
This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

2

#### Circuit Breaker/Frame



#### Thermal-Magnetic Trip Unit



**Note**

① Thermal-magnetic only.

## Product Selection

## Types MDL and HMDL Thermal-Magnetic Circuit Breakers with Interchangeable Trip Units—Two-Pole

Maximum Continuous Ampere Rating at 40°C	Standard Interrupting Capacity 600 Vac Rated 50 kAIC at 480 Vac		High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac		Thermal-Magnetic Trip Unit Only	Standard Terminals Only <sup>①</sup>  See Page V4-T2-211 for Optional Terminals Catalog Number
	Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals		Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals		Magnetic Trip Range is 5–10 Up Through 600A; 4–8 on 700 and 800A x Continuous Ampere Rating	
	Catalog Number	Frame Only Catalog Number	Catalog Number	Frame Only Catalog Number		
300	MDL2300	MDL2800F	HMDL2300	HMDL2800F	MT2300T	TA700MA1
350	MDL2350		HMDL2350		MT2350T	TA700MA1
400	MDL2400		HMDL2400		MT2400T	TA700MA1
450	MDL2450		HMDL2450		MT2450T	TA700MA1
500	MDL2500		HMDL2500		MT2500T	TA700MA1
600	MDL2600		HMDL2600		MT2600T	TA700MA1
700	MDL2700		HMDL2700		MT2700T	TA700MA1
800	MDL2800		HMDL2800		MT2800T	TA800MA2

## Types MDL and HMDL Thermal-Magnetic Circuit Breakers with Interchangeable Trip Units—Three-Pole

Maximum Continuous Ampere Rating at 40°C	Standard Interrupting Capacity 600 Vac Rated 50 kAIC at 480 Vac		High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac		Thermal-Magnetic Trip Unit Only	Standard Terminals Only <sup>①</sup>  See Page V4-T2-211 for Optional Terminals Catalog Number
	Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals		Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals		Magnetic Trip Range is 5–10 Up Through 600A; 4–8 on 700 and 800A x Continuous Ampere Rating	
	Catalog Number	Frame Only Catalog Number	Catalog Number	Frame Only Catalog Number		
300	MDL3300	MDL3800F	HMDL3300	HMDL3800F	MT3300T	TA700MA1
350	MDL3350		HMDL3350		MT3400T	TA700MA1
400	MDL3400		HMDL3400		MT3400T	TA700MA1
450	MDL3450		HMDL3450		MT3450T	TA700MA1
500	MDL3500		HMDL3500		MT3500T	TA700MA1
600	MDL3600		HMDL3600		MT3600T	TA700MA1
700	MDL3700		HMDL3700		MT3700T	TA700MA1
800	MDL3800		HMDL3800		MT3800T	TA800MA2

**Note**

<sup>①</sup> Two terminals are required per pole.

## Types MDLB and HMDLB Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units—Two-Pole ①

Maximum Continuous Ampere Rating at 40°C	Standard Interrupting Capacity 600 Vac Rated 50 kAIC at 480 Vac	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac	Standard Terminals Only ②
	Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals Catalog Number	Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals Catalog Number	See Page V4-T2-211 for Optional Terminals Catalog Number
300	MDLB2300	HMDLB2300	TA700MA1
350	MDLB2350	HMDLB2350	TA700MA1
400	MDLB2400	HMDLB2400	TA700MA1
450	MDLB2450	HMDLB2450	TA700MA1
500	MDLB2500	HMDLB2500	TA700MA1
600	MDLB2600	HMDLB2600	TA700MA1
700	MDLB2700	HMDLB2700	TA700MA1
800	MDLB2800	HMDLB2800	TA800MA2

## Types MDLB and HMDLB Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units—Three-Pole ①

Maximum Continuous Ampere Rating at 40°C	Standard Interrupting Capacity 600 Vac Rated 50 kAIC at 480 Vac	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac	Standard Terminals Only ②
	Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals Catalog Number	Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals Catalog Number	See Page V4-T2-211 for Optional Terminals Catalog Number
300	MDLB3300	HMDLB3300	TA700MA1
350	MDLB3350	HMDLB3350	TA700MA1
400	MDLB3400	HMDLB3400	TA700MA1
450	MDLB3450	HMDLB3450	TA700MA1
500	MDLB3500	HMDLB3500	TA700MA1
600	MDLB3600	HMDLB3600	TA700MA1
700	MDLB3700	HMDLB3700	TA700MA1
800	MDLB3800	HMDLB3800	TA800MA2

**Notes**

- ① Factory sealed for reverse feed application.  
 ② Two terminals are required per pole.

**Types MDL and HMDL Electronic Circuit Breakers with Interchangeable Trip Units**

Order as Individual Components: breaker frame, trip unit, rating plug, terminals.

**Types MDL and HMDL Electronic Circuit Breakers with Interchangeable Trip Units—Three-Pole**

Maximum Continuous Ampere Rating at 40°C ①	Circuit Breaker Frame Only		Digitrip RMS 310 Trip Unit Only ②		Digitrip RMS 310 Rating Plug Only			Terminals
	Standard Interrupting Capacity 600 Vac Rated 50 kAIC at 480 Vac	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac	L – Adjustable Long Delay Pickup (by Adjustable Rating Plug) S – Adjustable Short Delay Pickup with Fixed Short Delay Time (I <sup>2</sup> t Response) or Adjustable Short Delay Time (Flat Response) I – Adjustable Instantaneous Pickup by Setting Short Delay Time to Instantaneous G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Delay (Flat Response)		Fixed Rating Plug	Adjustable Rating Plugs	Ampere Rating	
	Catalog Number	Catalog Number	Catalog Number		Ampere Rating	Catalog Number	Catalog Number	
800	MDL3800F	HMDL3800F	MES3800LS		400	8MES400T	400/500/600/800	See Page V4-T2-211 for standard and optional terminals
			MES3800LSI		500	8MES500T	A8MES800T	
			MES3800LSG		600	8MES600T	620/640/660/680	
			MES3800LSIG		700	8MES700T	A8MES600T5	
			—		800	8MES800T	720/740/760/780 A8MES700T5	

**Types MDLB and HMDLB Electronic Circuit Breakers with Non-Interchangeable Trip Units ③**

Maximum Continuous Ampere Rating at 40°C ①	Factory-Assembled Circuit Breaker Consisting of Frame and Trip Unit			
	LS	LSI	LSG	LSIG
	Catalog Number	Catalog Number	Catalog Number	Catalog Number
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 50 kAIC at 480 Vac</b>				
800	MDLB3800T33W	MDLB3800T32W	MDLB3800T35W	MDLB3800T36W
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>				
800	HMDLB3800T33W	HMDLB3800T32W	HMDLB3800T35W	HMDLB3800T36W

**Notes**

- ① Ampere rating is established by rating plug.
- ② For AC use only.
- ③ Factory sealed, suitable for reverse feed application. CMDLB and CHMDLB are also available.



# 2.3

## Molded Case Circuit Breakers

### Series C

2

#### 100% Rated Types CMDL and CHMDL Electronic Circuit Breakers with Non-Interchangeable Trip Units

The NEC allows the breaker to be rated at 100% of its frame size in an assembly, provided that 90°C wire is applied at the 75°C ampacity. All 100% rated circuit breakers have electronic trip units. Order as individual components: breaker frame, trip unit, rating plug and terminals.

#### 100% Rated Types CMDL and CHMDL Electronic Circuit Breakers with Interchangeable Trip Units—Three-Pole

Maximum Continuous Ampere Rating at 40°C ①	Circuit Breaker Frame Only		Digitrip RMS 310 Trip Unit Only ②				Digitrip RMS 310 Trip Unit Only			Terminals
	Standard Interrupting Capacity 50 kAIC at 480 Vac	High Interrupting Capacity 65 kAIC at 480 Vac	Standard	Options	Adjustable Short Time Pickup and Delay	Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay and Ground Fault Protection	Independently Adjustable Short Time Pickup and Ground Fault Protection	Fixed Rating Plug	Adjustable Rating Plug	
	Catalog Number		Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay Ramp	Independently Adjustable Short Time Pickup and Ground Fault Protection	Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay and Ground Fault Protection	Independently Adjustable Short Time Pickup and Ground Fault Protection	Ampere Rating	Catalog Number	Ampere Rating	
800	CMDL3800F	CHMDL3800F	MES3800LS	MES3800LSI	MES3800LSG	MES3800LSIG	400	8MES400T	400/500/600/800	See Page V4-T2-211 for standard and optional terminals
							500	8MES500T	A8MES800T	
							600	8MES600T	620/640/660/680	
							700	8MES700T	A8MES600T5	
							800	8MES800T	720/740/760/780	
								A8MES700T5		

#### Molded Case Switches

Eaton's molded case switches are used as compact switches in applications requiring high current switching capabilities. Molded case switches are constructed of circuit breaker

components and are of the high instantaneous automatic type. Molded case switches are listed in accordance with Underwriters Laboratories Standard UL 489.

#### Molded Case Switches

Maximum Continuous Ampere Rating at 40°C	600 Vac Maximum, 250 Vdc Circuit Breaker Only without Line and Load Terminals Catalog Number
<b>Two-Pole</b>	
800	MDL2800WK
	MDLB2800WK ③
	HMDL2800WK
<b>Three-Pole</b>	
800	MDL3800WK
	MDLB3800WK ③
	HMDL3800WK

#### Notes

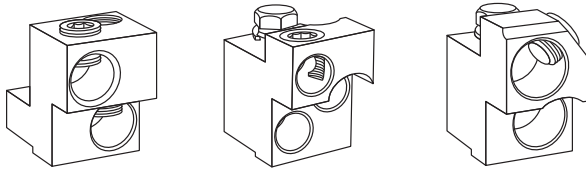
- ① Ampere rating is established by rating plug.
- ② For AC use only.
- ③ MDLB and HMDLB are suitable for reverse feed applications.

Molded case switch may trip above 6000 amperes.

**Accessories Selection Guide and Ordering Information**

**Line and Load Terminals**

M-Frame circuit breakers use Cu/Al terminals as standard. When optional copper or Cu/Al terminals are required, order by catalog number. Specify if factory installation is required.



**TA700MA1                      TA800MA2                      TA801MA**

**Line and Load Terminals**

Maximum Breaker Amperes	Terminal Body Material	Wire Type	AWG Wire Range/No. Conductors	Terminal Catalog Number	Terminals with Control Wire Termination Catalog Number
<b>Standard Cu/Al Pressure Terminals</b>					
700	Aluminum	Cu/Al	1–500 kcmil (2)	<b>TA700MA1</b>	<b>TA700MA1CWT</b>
800 std.	Aluminum	Cu/Al	3/0–400 kcmil (3)	<b>TA800MA2</b>	<b>TA800MA2CWT</b>
800	Aluminum	Cu/Al	500–750 kcmil (2)	<b>TA801MA</b>	<b>TA801MACWT</b>
<b>Optional Copper and Cu/Al Pressure Type Terminals</b>					
600	Copper	Cu	2/0–500 kcmil (2)	<b>T600MA1</b>	—
800	Copper	Cu	3/0–300 kcmil (3)	<b>T800MA1</b>	—

## Accessories

**Allowable Accessory Combinations**

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

**MD Frame Accessories**

Description	Reference Page	Two-Pole <sup>①</sup>		Three-Pole		
		Left	Right	Left	Center	Right
<b>Internal Accessories (Only One Internal Accessory Per Pole)</b>						
Alarm lockout (Make/Break)	V4-T2-271	■	■	■		■
Alarm lockout (2Make/2Break)	V4-T2-271	■	■	■		■
Auxiliary switch (1A, 1B)	V4-T2-273	■	■	■		■
Auxiliary switch (2A, 2B)	V4-T2-273	■	■	■		■
Auxiliary switch (3A, 3B)	V4-T2-273	■	■	■		■
Auxiliary switch (1A, 1B) and alarm switch combination	V4-T2-275	■	■	■		■
Auxiliary switch (2A, 2B) and alarm switch combination	V4-T2-275	■	■	■		■
Shunt trip—standard <sup>②</sup>	V4-T2-278	■	■	■		■
Shunt trip—low energy <sup>②</sup>	V4-T2-280	■	■	■		■
Undervoltage release mechanism <sup>②</sup>	V4-T2-286	■	■	■		■
<b>External Accessories</b>						
Base mounting hardware	V4-T2-306				●	
Terminal shields	V4-T2-308				●	
Interphase barriers	V4-T2-308				●	
Non-padlockable handle block	V4-T2-309				■	
Padlockable handle lock hasp	V4-T2-310	□		□		□
Key interlock kit	V4-T2-311	□		□		□
Sliding bar interlock—requires two breakers	V4-T2-312	●	●	●	●	●
Walking beam interlock—requires two breakers	V4-T2-312	●	●	●	●	●
Electrical (motor) operator	V4-T2-313	●	●	●	●	●
Plug-in adapters	V4-T2-315	●	●	●	●	●
Rear connecting studs	V4-T2-316	●	●	●	●	●
Panelboard connecting straps	V4-T2-317	●	●	●	●	●
Handle mechanisms	V4-T2-419	●	●	●	●	●
Handle extension	V4-T2-434	●	●	●	●	●
Solid-state (electronic) portable test kit	V4-T2-319	●	●	●	●	●
<b>Modifications (Refer to Eaton)</b>						
Special calibration	—	●	●	●	●	●
Moisture fungus treatment	V4-T2-110	●	●	●	●	●
Freeze-tested circuit breakers	—	●	●	●	●	●
Marine/naval application	—	●	●	●	●	●

**Legend**

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

**Notes**

- ① Two-pole breaker supplied in three-pole frame. Current carrying parts omitted from center pole.  
 ② Shunt trip and UVR cannot be mounted in right poles on MES trip units.

## Technical Data and Specifications

### UL 489/CSA Interrupting Capacity Ratings <sup>①</sup>

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)			Volts DC <sup>②③</sup>
		Volts AC (50/60 Hz)			
		240	480	600	
MDL, MDLB	2, 3	65	50	25	22
CMDL	2, 3	65	50	25	—
HMDL, HMDLB	2, 3	100	65	35	25
CHMDL	2, 3	100	65	35	—

### IEC 947-2 Interrupting Capacity Ratings <sup>①</sup>

Circuit Breaker Type	Number of Poles	Interrupting Capacity rms (kA Symmetrical Amperes) $I_{CU} \neq I_{CS}$			Volts DC <sup>②③</sup>
		Volts AC (50/60 Hz)			
		240	415	690	
MDL, MDLB	2, 3	65/65	50/50	20/10	20/10
CMDL	2, 3	65/65	50/50	20/10	—
HMDL, HMDLB	2, 3	100/100	70/50	25/13	20/10
CHMDL	2, 3	100/100	70/50	25/13	—

#### Notes

- ① Utilization Category A circuit breakers.
- ② Two-pole or two poles of three-pole circuit breaker. Thermal-magnetic trip units only, MDL, HMDL breakers with electronic trip unit are not DC rated.
- ③ Time constant is 3 milliseconds minimum at 10 kA and 8 milliseconds at 22 kA.

**Specifications****MDL-Frame Digitrip**

<b>Trip Unit Type</b>	<b>Digitrip RMS 310</b>	
rms sensing	Yes	Yes
<b>Breaker Type</b>		
Frame	MDL, MDLB, CMDL, HMDL, HMDLB, CHMDL	MDL, MDLB, CMDL, HMDL, HMDLB, CHMDL
Ampere range	400–800A	400–800A
Interrupting rating at 480 volts	50, 65 (kA)	50, 65 (kA)
<b>Protection</b>		
Ordering options	LS, LSG	LSI, LSIG
Fixed rated plug ( $I_n$ )	Yes	Yes
Overtemperature trip	Yes	Yes
<b>Long Delay Protection (L)</b>		
Adjustable rating plug ( $I_n$ )	Yes	Yes
Long delay pickup	0.5–1.0 ( $I_n$ ) <sup>①</sup>	0.5–1.0 ( $I_n$ ) <sup>①</sup>
Long delay time $I^2t$	12 seconds	12 seconds
Long delay time $I^4t$	No	No
Long delay thermal memory	Yes	Yes
High load alarm	No	No
<b>Short Delay Protection (S)</b>		
Short delay pickup	200–800% x ( $I_n$ )	200–800% x ( $I_n$ )
Short delay time $I^2t$	100 ms	No
Short delay time flat	No	Inst–300 ms
Short delay time zone selective interlocking	No	No
<b>Instantaneous Protection (I)</b>		
Instantaneous pickup	No	200–800% x ( $I_n$ )
Discriminator	No	No
Instantaneous override	Yes	Yes
<b>Ground Fault Protection (G)</b>		
Ground fault alarm	No	No
Ground fault pickup	1–5 x $I_g$ (160A)	1–5 x $I_g$ (160A)
Ground fault delay $I^2t$	No	No
Ground fault delay flat	Inst–500 ms	Inst–500 ms
Ground fault zone selective interlocking	No	No
Ground fault thermal memory	Yes	Yes
<b>System Diagnostics</b>		
Status LEDs	Yes	Yes
Cause of trip LEDs	No	No
Magnitude of trip information	No	No
Remote signal contacts—ground alarm	Yes <sup>②</sup>	Yes <sup>②</sup>
<b>System Monitoring</b>		
Digital display	No	No
Current	No	No
Power and energy	No	No
Power quality—harmonics	No	No
Power factor	No	No
<b>Communications</b>		
Eaton's PowerNet	No	No
<b>Testing</b>		
Testing method	Test set	Test set

**Legend**  
 $I_n$  = Rating Plug

**Notes**  
<sup>①</sup> Adjust by rating plug.  
<sup>②</sup> With separate ground fault alarm unit (GFAU).

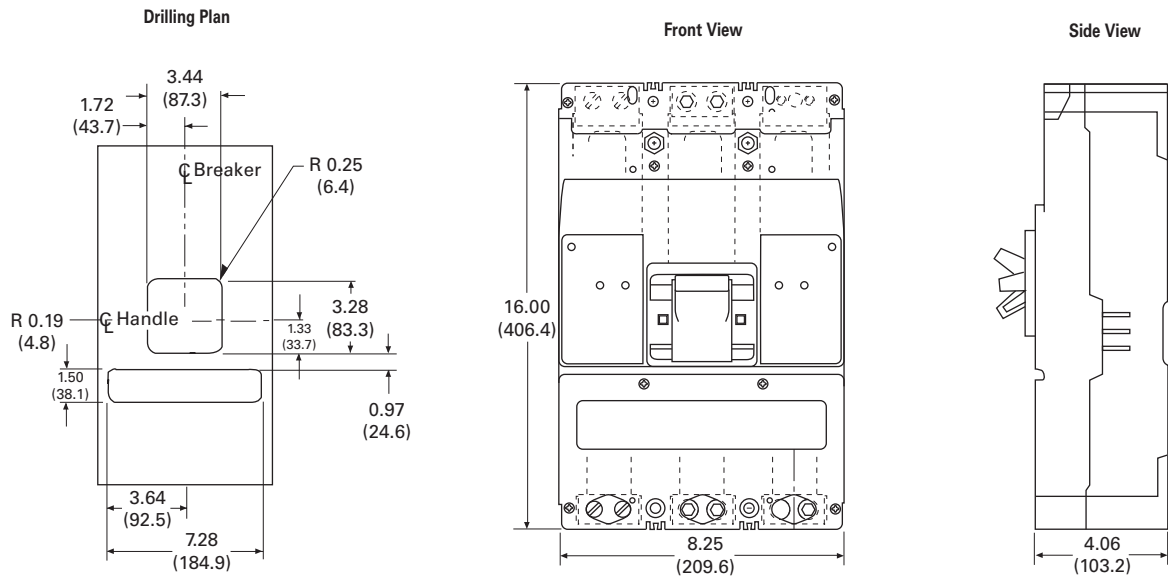
## Dimensions and Weights

Dimensions in Inches (mm)

### MD Frame

Number of Poles	Width	Height	Depth
2, 3	8.25 (209.6)	16.00 (406.4)	4.06 (103.1)

### MDL-Frame, Two- and Three-Pole



Approximate Shipping Weight, Lbs (kg)

### MD Frame

Breaker Type	Complete Breaker		Frame Only		Trip Unit <sup>①</sup>	
	Two-Pole	Three-Pole	Two-Pole	Three-Pole	Two-Pole	Three-Pole
MDL, HMDL (T/M T.U.)	26.5 (12.0)	29.0 (13.2)	24.5 (11.1)	26.0 (11.8)	2.5 (1.1)	3.0 (1.4)
MDL, HMDL (Elec. T.U.)	—	30.0 (13.6)	—	26.0 (11.8)	—	4.0 (1.8)

#### Note

<sup>①</sup> Thermal-magnetic only.

Typical N-Frame Breaker

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F-Frame (10–225 Amperes) . . . . .	<b>V4-T2-129</b>
J-Frame (70–250 Amperes) . . . . .	<b>V4-T2-146</b>
K-Frame (70–400 Amperes) . . . . .	<b>V4-T2-154</b>
L-Frame (125–600 Amperes) . . . . .	<b>V4-T2-179</b>
M-Frame (300–800 Amperes) . . . . .	<b>V4-T2-205</b>
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### N-Frame (400–1200 Amperes)

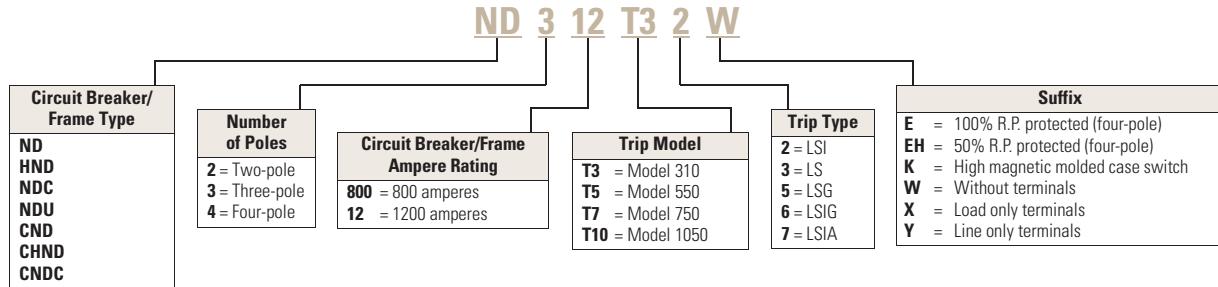
#### Product Description

- All Eaton N-Frame circuit breakers are suitable for reverse feed use
- All N-Frame circuit breakers are HACR rated

## Catalog Number Selection

This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

### Circuit Breaker/Frame





# 2.3

## Molded Case Circuit Breakers

### Series C

#### Product Selection

2

#### Digitrip OPTIM Electronic Circuit Breakers with Interchangeable Rating Plugs

Order as individual components: breaker frame (which includes trip unit), rating plug, terminals.

#### Digitrip OPTIM 550 Electronic Circuit Breakers with Interchangeable Rating Plugs

##### Circuit Breaker Frame Only

- L – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time ( $I^2t$  or  $I^4t$  Response) <sup>①</sup>
- S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$  or Flat Response)
- I – Adjustable Instantaneous Pickup
- G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay ( $I^2t$  or Flat Response)
- A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time Delay ( $I^2t$  or Flat Response)

##### OPTIM 550 <sup>②</sup>

##### Digitrip OPTIM Rating Plug Only

Maximum Continuous Ampere Rating at 40°C	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 50 kAIC at 480 Vac</b>					
800	ND3800T52W	ND3800T56W	ND3800T57W	400	ORPN80A400
				450	ORPN80A450
				500	ORPN80A500
				550	ORPN80A550
				600	ORPN80A600
				700	ORPN80A700
				800	ORPN80A800
1200	ND312T52W	ND312T56W	ND312T57W	600	ORPN12A600
				700	ORPN12A700
				800	ORPN12A800
				1000	ORPN12A100
				1200	ORPN12A120
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>					
800	HND3800T52W	HND3800T56W	HND3800T57W	400	ORPN80A400
				450	ORPN80A450
				500	ORPN80A500
				550	ORPN80A550
				600	ORPN80A600
				700	ORPN80A700
				800	ORPN80A800
1200	HND312T52W	HND312T56W	HND312T57W	600	ORPN12A600
				700	ORPN12A700
				800	ORPN12A800
				1000	ORPN12A100
				1200	ORPN12A120

#### Notes

- ① Long delay  $I^4t$  response selection limits short delay time to flat response.
- ② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.

Digitrip OPTIM 550 Electronic Circuit Breakers with Interchangeable Rating Plugs, continued

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only			Digitrip OPTIM Rating Plug Only	
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
	L – Adjustable Long Delay Pickup (I <sub>1</sub> ) with Adjustable Long Delay Time (I <sup>2</sup> t or I <sup>4</sup> t Response) ① S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I <sup>2</sup> t or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay (I <sup>2</sup> t or Flat Response) A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time Delay (I <sup>2</sup> t or Flat Response) OPTIM 550 ②				
<b>Three-Pole Ultra High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>					
800	NDC3800T52W	NDC3800T56W	NDC3800T57W	400	ORPN80A400
				450	ORPN80A450
				500	ORPN80A500
				550	ORPN80A550
				600	ORPN80A600
				700	ORPN80A700
1200	NDC312T52W	NDC312T56W	NDC312T57W	600	ORPN12A600
				700	ORPN12A700
				800	ORPN12A800
				1000	ORPN12A100
				1100	ORPN12A110
				1200	ORPN12A120

Notes

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.
- ② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.

# 2.3

## Molded Case Circuit Breakers

### Series C

2

#### Digitrip OPTIM 1050 Electronic Circuit Breakers with Interchangeable Rating Plugs

##### Circuit Breaker Frame Only

- L– Adjustable Long Delay Pickup (L) with Adjustable Long Delay Time (I<sup>2</sup>t or I<sup>4</sup>t Response) <sup>①</sup>
- S– Adjustable Short Delay Pickup with Adjustable Short Delay Time (I<sup>2</sup>t or Flat Response)
- I– Adjustable Instantaneous Pickup
- G– Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay (I<sup>2</sup>t or Flat Response)
- A– Adjustable Ground Fault Alarm with Adjustable Ground Fault Time Delay (I<sup>2</sup>t or Flat Response)

##### OPTIM 1050 <sup>②③</sup>

##### Digitrip OPTIM Rating Plug Only

Maximum Continuous Ampere Rating at 40°C	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 50 kAIC at 480 Vac</b>				
800	ND3800T106W	ND3800T107W	400	ORPN80A400
			450	ORPN80A450
			500	ORPN80A500
			550	ORPN80A550
			600	ORPN80A600
			700	ORPN80A700
1200	ND312T106W	ND312T107W	600	ORPN12A600
			700	ORPN12A700
			800	ORPN12A800
			1000	ORPN12A100
			1200	ORPN12A120
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>				
800	HND3800T106W	HND3800T107W	400	ORPN80A400
			450	ORPN80A450
			500	ORPN80A500
			550	ORPN80A550
			600	ORPN80A600
			700	ORPN80A700
1200	HND312T106W	HND312T107W	600	ORPN12A600
			700	ORPN12A700
			800	ORPN12A800
			1000	ORPN12A100
			1200	ORPN12A120
<b>Three-Pole Ultra High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>				
800	NDC3800T106W	NDC3800T107W	400	ORPN80A400
			450	ORPN80A450
			500	ORPN80A500
			550	ORPN80A550
			600	ORPN80A600
			700	ORPN80A700
1200	NDC312T106W	NDC312T107W	600	ORPN12A600
			700	ORPN12A700
			800	ORPN12A800
			1000	ORPN12A100
			1200	ORPN12A120

#### Notes

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.
- ② One Form C auxiliary switch and one Form C bell (trip) alarm switch supplied with breaker as standard.
- ③ Factory sealed.

**100% Rated Digitrip OPTIM Circuit Breakers with Interchangeable Rating Plugs**

Order as individual components: breaker frame (which includes trip unit), rating plug, terminals.

**100% Rated Digitrip OPTIM 550 Circuit Breakers with Interchangeable Rating Plugs**

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only			Digitrip OPTIM Rating Plug Only	
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 50 kAIC at 480 Vac</b>					
800	CND3800T52W	CND3800T56W	CND3800T57W	400	ORPN80A400
				450	ORPN80A450
				500	ORPN80A500
				550	ORPN80A550
				600	ORPN80A600
				700	ORPN80A700
				800	ORPN80A800
1200 <sup>③</sup>	CND312T52W	CND312T56W	CND312T57W	600	ORPN12A600
				700	ORPN12A700
				800	ORPN12A800
				1000	ORPN12A100
				1200	ORPN12A120
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>					
800	CHND3800T52W	CHND3800T56W	CHND3800T57W	400	ORPN80A400
				450	ORPN80A450
				500	ORPN80A500
				550	ORPN80A550
				600	ORPN80A600
				700	ORPN80A700
				800	ORPN80A800
1200 <sup>③</sup>	CHND312T52W	CHND312T56W	CHND312T57W	600	ORPN12A600
				700	ORPN12A700
				800	ORPN12A800
				1000	ORPN12A100
				1200	ORPN12A120

**Notes**

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.
- ② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.
- ③ Includes conductor extension kit, which increases breaker length 3.75 on each end. Terminal ordered separate.

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## Molded Case Circuit Breakers

### Series C

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#### 100% Rated Digitrip OPTIM 550 Circuit Breakers with Interchangeable Rating Plugs, continued

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only			Digitrip OPTIM Rating Plug Only	
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
	L – Adjustable Long Delay Pickup (I <sub>l</sub> ) with Adjustable Long Delay Time (I <sup>2</sup> t or I <sup>4</sup> t Response) <sup>①</sup> S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I <sup>2</sup> t or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay (I <sup>2</sup> t or Flat Response) A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time Delay (I <sup>2</sup> t or Flat Response) OPTIM 550 <sup>②</sup>				
<b>Three-Pole Ultra High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>					
800	CNDC3800T52W	CNDC3800T56W	CNDC3800T57W	400	ORPN80A400
				450	ORPN80A450
				500	ORPN80A500
				550	ORPN80A550
				600	ORPN80A600
				700	ORPN80A700
				800	ORPN80A800
1200 <sup>③</sup>	CNDC312T52W	CNDC312T56W	CNDC312T57W	600	ORPN12A600
				700	ORPN12A700
				800	ORPN12A800
				1000	ORPN12A100
				1200	ORPN12A120

**Notes**

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.
- ② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.
- ③ Includes conductor extension kit, which increases breaker length 3.75 on each end. Terminal ordered separate.

100% Rated Digitrip OPTIM 1050 Circuit Breakers with Interchangeable Rating Plugs

Circuit Breaker Frame Only

- L – Adjustable Long Delay Pickup (I<sub>1</sub>) with Adjustable Long Delay Time (I<sup>2</sup>t or I<sup>4</sup>t Response) ①
- S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I<sup>2</sup>t or Flat Response)
- I – Adjustable Instantaneous Pickup
- G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay (I<sup>2</sup>t or Flat Response)
- A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time Delay (I<sup>2</sup>t or Flat Response)

Digitrip OPTIM Rating Plug Only

Maximum Continuous Ampere Rating at 40°C	OPTIM 1050 ②③ LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 50 kAIC at 480 Vac</b>				
800	CND3800T106W	CND3800T107W	400	ORPN80A400
			450	ORPN80A450
			500	ORPN80A500
			550	ORPN80A550
			600	ORPN80A600
			700	ORPN80A700
1200	CND312T106W	CND312T107W	800	ORPN80A800
			600	ORPN12A600
			700	ORPN12A700
			800	ORPN12A800
			1000	ORPN12A100
			1200	ORPN12A120
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>				
800	CHND3800T106W	CHND3800T107W	400	ORPN80A400
			450	ORPN80A450
			550	ORPN80A550
			600	ORPN80A600
			700	ORPN80A700
			800	ORPN80A800
1200	CHND312T106W	CHND312T107W	600	ORPN12A600
			700	ORPN12A700
			800	ORPN12A800
			1000	ORPN12A100
			1200	ORPN12A120

Notes

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.
- ② One Form C auxiliary switch one Form C bell (trip) alarm switch supplied with breaker as standard.
- ③ Factory sealed.

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## Molded Case Circuit Breakers

### Series C

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#### 100% Rated Digitrip OPTIM 1050 Circuit Breakers with Interchangeable Rating Plugs, continued

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only		Digitrip OPTIM Rating Plug Only	
	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
	OPTIM 1050 ②③ L – Adjustable Long Delay Pickup (I <sub>l</sub> ) with Adjustable Long Delay Time (I <sup>2</sup> t or I <sup>4</sup> t Response) ① S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I <sup>2</sup> t or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay (I <sup>2</sup> t or Flat Response) A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time Delay (I <sup>2</sup> t or Flat Response)			
<b>Three-Pole Ultra High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>				
800	CNDC3800T106W	CNDC3800T107W	400	ORPN80A400
			450	ORPN80A450
			500	ORPN80A500
			550	ORPN80A550
			600	ORPN80A600
			700	ORPN80A700
1200	CNDC312T106W ④	CNDC312T107W	600	ORPN12A600
			700	ORPN12A700
			800	ORPN12A800
			1000	ORPN12A100
			1200	ORPN12A120

#### Type ND Molded Case Switches

#### Type ND High Instantaneous (K)

Continuous Ampere Rating at 40°C	Three-Pole Catalog Number	Four-Pole ⑤ Catalog Number
800	ND3800WK	ND4800WK
	HND3800WK	HND4800WK
1200	ND312WK	ND412WK
	HND312WK	HND412WK

#### Notes

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.
- ② One Form C auxiliary switch one Form C bell (trip) alarm switch supplied with breaker as standard.
- ③ Factory sealed.
- ④ Includes conductor extension kit, which increases breaker length 3.75 on each end. Terminal ordered separate.
- ⑤ Neutral is in right pole.

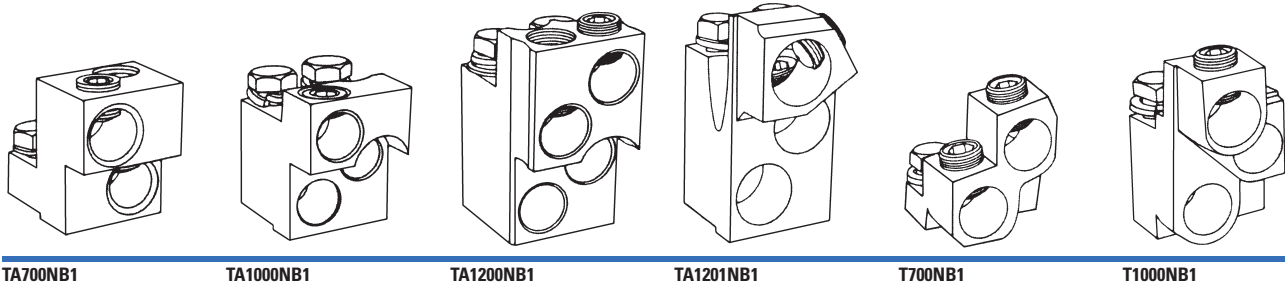
Molded case switch will trip above 14,000 amperes.

For UL listed, series tested molded case switch application data, refer to Eaton.

**Accessories Selection Guide and Ordering Information**

**Line and Load Terminals—Ordering Information**

N-Frame circuit breakers use Cu/Al terminals as standard. When optional copper or Cu/Al terminals are required, order by catalog number. Specify if factory installation is required.



**Line and Load Terminals**

Maximum Breaker Amperes	Terminal Body Material	Wire Type	AWG Wire Range/ No. Conductors	Metric Wire Range mm <sup>2</sup>	Catalog Number
<b>Standard Cu/Al Pressure Terminals</b>					
700	Aluminum	Cu/Al	1–500 kcmil (2)	50–240	<b>TA700NB1</b>
1000	Aluminum	Cu/Al	3/0–400 kcmil (3)	95–185	<b>TA1000NB1</b> ①
1200	Aluminum	Cu/Al	4/0–500 kcmil (4)	120–240	<b>TA1200NB1</b> ①
1200	Aluminum	Cu/Al	500–750 kcmil (3)	300–400	<b>TA1201NB1</b> ②
<b>Optional Copper and Cu/Al Pressure Type Terminals</b>					
700	Copper	Cu	2/0–500 kcmil (2)	70–240	<b>T700NB1</b>
1000	Copper	Cu	3/0–500 kcmil (3)	95–240	<b>T1000NB1</b>
1200	Copper	Cu	3/0–400 kcmil (4)	95–185	<b>T1200NB3</b>

**Notes**

- ① Terminal rating is AL9CU.
- ② Terminal rating is AL7CU.



## Accessories

**Allowable Accessory Combinations**

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

**ND Frame Accessories**

Description	Reference Page	Three-Pole			Four-Pole			Neutral
		Left	Center	Right	Left	Center	Right	
<b>Internal Accessories (Only One Internal Accessory Per Pole) ①</b>								
Alarm lockout (Make/Break)	V4-T2-271	■		■	■		■	
Alarm lockout (2Make/2Break)	V4-T2-271	■		■	■		■	
Auxiliary switch (1A, 1B)	V4-T2-273	■		■	■		■	
Auxiliary switch (2A, 2B)	V4-T2-273	■		■	■		■	
Auxiliary switch (3A, 3B)	V4-T2-273	■		■	■		■	
Auxiliary switch (1A, 1B) and alarm switch combination	V4-T2-275	■		■	■		■	
Auxiliary switch (2A, 2B) and alarm switch combination	V4-T2-275	■		■	■		■	
Shunt trip—standard	V4-T2-279	■			■			
Shunt trip—low energy	V4-T2-280	■			■			
Undervoltage release mechanism	V4-T2-287	■			■			
Eaton PowerNet communications kit (OPTIM 550)	V4-T2-288			■				
<b>External Accessories</b>								
Base mounting hardware	V4-T2-306	●	●	●	●	●	●	●
Interphase barriers	V4-T2-308	●	●	●	●	●	●	●
Terminal shield	V4-T2-308	■	■	■				
Non-padlockable handle block	V4-T2-309		■			■		
Padlockable handle lock hasp	V4-T2-310	□		□	□		□	
Key interlock kit	V4-T2-311	□		□	□		□	
Sliding bar interlock—requires two breakers	V4-T2-312	●	●	●				
Walking beam interlock—requires two breakers	V4-T2-312	●	●	●	●	●	●	●
Electrical (motor) operator	V4-T2-314	●	●	●	●	●	●	●
Plug-in adapters	V4-T2-315	●	●	●	●	●	●	●
Rear connecting studs	V4-T2-316	●	●	●	●	●	●	●
Panelboard connecting straps	V4-T2-317	●	●	●	●	●	●	●
Handle mechanisms	V4-T2-419	●	●	●	●	●	●	●
Handle extension	V4-T2-434	●	●	●	●	●	●	●
Solid-state (electronic) portable test kit	V4-T2-320	●	●	●	●	●	●	●
<b>OPTIM System Components Three Poles</b>								
Ground fault alarm unit	V4-T2-319							
Potential transformer module	V4-T2-319							
Breaker interface module (BIM)	V4-T2-320							
Digitrip OPTIMizer	V4-T2-320							
Auxiliary power module	V4-T2-320							
<b>Modifications (Refer to Eaton)</b>								
Special calibration	—	●	●	●	●	●	●	●
Moisture fungus treatment	V4-T2-110	●	●	●	●	●	●	●
Freeze-tested circuit breakers	—	●	●	●	●	●	●	●
Marine/naval application	—	●	●	●	●	●	●	●

**Legend**

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

**Note**

① OPTIM 550 and 1050 are factory sealed and do not have the right pole available for accessories.

## Technical Data and Specifications

### UL 489 Interrupting Capacity Ratings <sup>①</sup>

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)			
		Volts AC (50/60 Hz)			
		240	277	480	600
ND	2, 3, 4	65	—	50	25
CND <sup>②</sup>	2, 3, 4	65	—	50	25
HND	2, 3, 4	100	—	65	35
CHND <sup>②</sup>	2, 3, 4	100	—	65	35
NDC	2, 3, 4	200	—	100	65
CNDC <sup>②</sup>	2, 3, 4	200	—	100	65
NDU <sup>③</sup>	3	300 <sup>④</sup>	—	150	75 <sup>⑤</sup>

### IEC 947-2 Interrupting Capacity Ratings <sup>①</sup>

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)		
		Volts AC (50/60 Hz)		
		240	415	690
<b>ND</b>				
$I_{CU}$	2, 3, 4	85	50	20
$I_{CS}$	2, 3, 4	85	50	10
<b>CND <sup>②</sup></b>				
$I_{CU}$	2, 3, 4	85	50	20
$I_{CS}$	2, 3, 4	85	50	10
<b>HND</b>				
$I_{CU}$	2, 3, 4	100	70	25
$I_{CS}$	2, 3, 4	100	50	13
<b>CHND <sup>②</sup></b>				
$I_{CU}$	2, 3, 4	100	70	25
$I_{CS}$	2, 3, 4	100	50	13
<b>NDC</b>				
$I_{CU}$	2, 3, 4	200	100	35
$I_{CS}$	2, 3, 4	100	50	18
<b>CNDC <sup>②</sup></b>				
$I_{CU}$	2, 3, 4	200	100	35
$I_{CS}$	2, 3, 4	100	50	18

#### Notes

- ① Utilization Category A circuit breakers.
- ② 100% rated breakers.
- ③ 800 amperes maximum rating.
- ④ Successfully tested at 300 kAIC, although UL recognizes maximum of 200 kAIC at 240 Vac.
- ⑤ Successfully tested at 75 kAIC, although UL recognizes maximum of 65 kAIC at 600 Vac.

## N-Frame Digitrip

Trip Unit Type	Digitrip OPTIM 550	Digitrip OPTIM 1050
rms sensing	Yes	Yes
<b>Breaker Type</b>		
Frame	N	N
Ampere range	400–1200A	400–1200A
Interrupting rating at 480 volts	50, 65, 100 (kA)	50, 65, 100 (kA)
<b>Protection</b>		
Ordering options	LSI, LSIG, LSI(A)	LSI(A), LISG
Fixed rated plug ( $I_n$ )	Yes	Yes
Overtemperature trip	Yes	Yes
<b>Long Delay Protection (L)</b>		
Adjustable rating plug ( $I_n$ )	No	No
Long delay pickup	0.4–1.0 x ( $I_n$ )	0.4–1.0 x ( $I_n$ )
Long delay time $I^2t$	2–24 seconds	2–24 seconds
Long delay time $I^4t$	1–5 seconds	1–5 seconds
Long delay thermal memory	Yes	Yes
High load alarm	No	0.5–1.0 x $I_r$
<b>Short Delay Protection (S)</b>		
Short delay pickup	150–800% x ( $I_r$ )	150–800% x ( $I_r$ )
Short delay time $I^2t$	100–500 ms	100–500 ms
Short delay time flat	100–500 ms	100–500 ms
Short delay time zone selective interlocking	Yes	Yes
<b>Instantaneous Protection (I)</b>		
Instantaneous pickup	200–800% x ( $I_n$ )	200–800% x ( $I_n$ )
Discriminator	Yes	Yes
Instantaneous override	Yes	Yes
<b>Ground Fault Protection (G)</b>		
Ground fault alarm	20–100% x ( $I_g$ )	20–100% x ( $I_g$ )
Ground fault pickup	20–100% x ( $I_g$ )	20–100% x ( $I_g$ )
Ground fault delay $I^2t$	100–500 ms	100–500 ms
Ground fault delay flat	100–500 ms	100–500 ms
Ground fault zone selective interlocking	Yes ①	Yes
Ground fault thermal memory	Yes	Yes
<b>System Diagnostics</b>		
Status LEDs	Yes	Yes
Cause of trip LEDs	Yes	Yes
Magnitude of trip information	Yes	Yes
Remote signal contact—ground alarm	Yes ①	Yes
Local auxiliary and bell alarm contact	Optional	Included

**Legend**

BIM = Breaker Interface Module  
 (A) = GF Alarm  
 $I_s$  = Sensor Rating  
 $I_n$  = Rating Plug  
 $I_r$  = Long Delay Pickup Setting

**Note**

① Zone interlock kit.

**N-Frame Digitrip, continued**

<b>Trip Unit Type</b>	<b>Digitrip OPTIM 550</b>	<b>Digitrip OPTIM 1050</b>
<b>System Monitoring</b>		
Digital display	Yes <sup>①</sup>	Yes <sup>①</sup>
Current	Yes	Yes
Power and energy	No	Yes
Power quality—harmonics	No	Yes
Power factor	No	Yes
<b>Communications</b>		
Eaton PowerNet	No <sup>②</sup>	Yes
<b>Testing</b>		
Testing method	OPTIMizer, BIM, PowerNet	OPTIMizer, BIM, PowerNet

**Legend**

BIM = Breaker Interface Module  
 (A) = GF Alarm  
 $I_s$  = Sensor Rating  
 $I_n$  = Rating Plug  
 $I_r$  = Long Delay Pickup Setting

**Notes**

- ① By OPTIMizer/BIM.  
 ② Eaton's PowerNet kit.

# 2.3

## Molded Case Circuit Breakers

### Series C

#### Dimensions and Weights

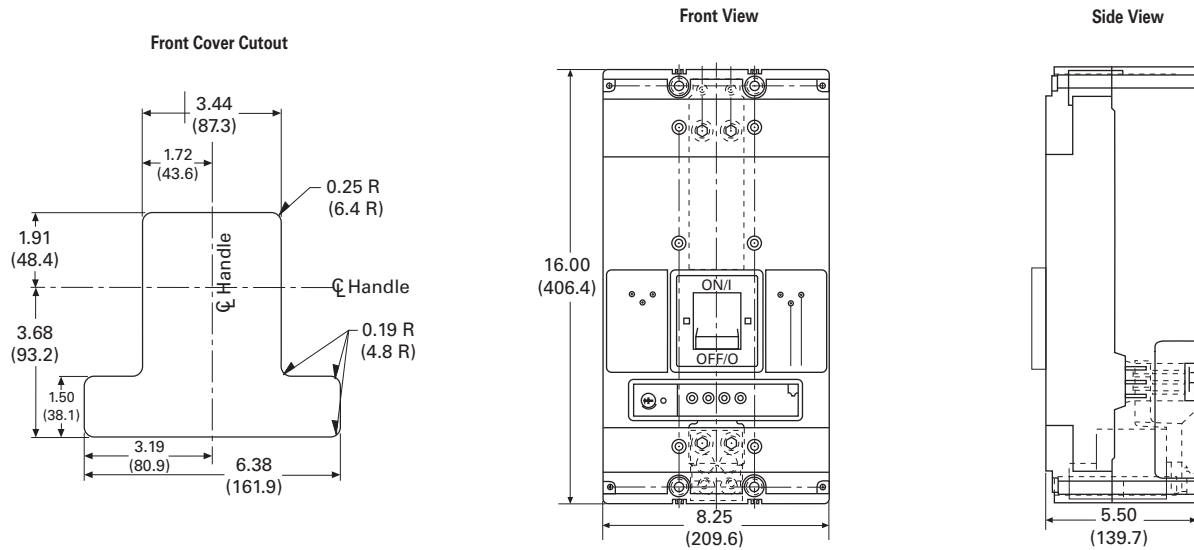
Approximate Dimensions in Inches (mm)

2

#### ND Frame

Number of Poles	Width	Height	Depth
2, 3	8.25 (209.6)	16.00 (406.4)	5.50 (139.7)
4	11.13 (282.6)	16.00 (406.4)	5.50 (139.7)

#### ND-Frame, Two- and Three-Pole

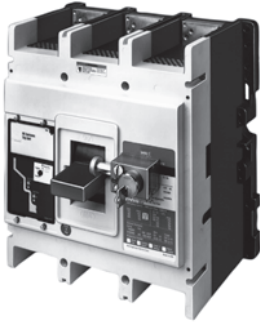


Approximate Shipping Weight in Lbs (kg)

#### ND Frame

Breaker Type	Complete Breaker		
	Two-Pole	Three-Pole	Four-Pole
ND, HND, NDC, NDU	37 (16.8)	45 (20.4)	58 (26.3)

Typical R-Frame Breaker



**Contents**

<i>Description</i>	<i>Page</i>
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Quick Reference . . . . .	<b>V4-T2-112</b>
G-Frame (15–100 Amperes) . . . . .	<b>V4-T2-115</b>
F-Frame (10–225 Amperes) . . . . .	<b>V4-T2-129</b>
J-Frame (70–250 Amperes) . . . . .	<b>V4-T2-146</b>
K-Frame (70–400 Amperes) . . . . .	<b>V4-T2-154</b>
L-Frame (125–600 Amperes) . . . . .	<b>V4-T2-179</b>
M-Frame (300–800 Amperes) . . . . .	<b>V4-T2-205</b>
N-Frame (400–1200 Amperes) . . . . .	<b>V4-T2-216</b>
R-Frame (800–2500 Amperes)	
Catalog Number Selection . . . . .	<b>V4-T2-232</b>
Product Selection . . . . .	<b>V4-T2-233</b>
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Motor Protection Circuit Breakers (MPCB) . . . . .	<b>V4-T2-261</b>
Type ELC Current Limiter Attachment (Size 0–4) . . . . .	<b>V4-T2-263</b>
Current Limiting Circuit Breaker Module . . . . .	<b>V4-T2-264</b>
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External Accessories . . . . .	<b>V4-T2-299</b>

**R-Frame (800–2500 Amperes)**

**Product Description**

- Eaton R-Frame circuit breakers are available as frame (which includes trip unit), rating plug and terminals
- All R-Frame circuit breakers are suitable for reverse feed use

# 2.3

## Molded Case Circuit Breakers

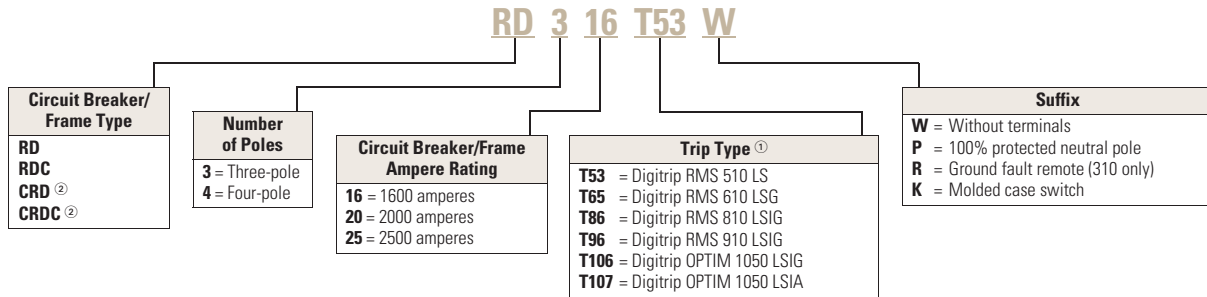
### Series C

#### Catalog Number Selection

This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

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#### Circuit Breaker/Frame



#### Notes

- ① For complete list of available trip types, refer to **Pages V4-T2-233 to V4-T2-242**.
- ② No four-pole for CRD and CRDC.

**Product Selection**

**Digitrip RMS 510 Electronic Circuit Breakers with Interchangeable Rating Plugs**

Order as individual components: breaker frame (which includes trip unit) and rating plug.

**Digitrip RMS 510 Electronic Circuit Breakers with Interchangeable Rating Plugs**

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only						Digitrip Rating Plug Only	
	L – Adjustable Long Delay Pickup ( $I_n$ ) with Adjustable Long Delay Time S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$ or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay ( $I^2t$ or Flat Response)						Rated Current ( $I_n$ )	Fixed Rating Plug Catalog Number
	LI	LS	LSI	LIG	LSG	LSIG		
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>								
1600	RD316T51W	RD316T53W	RD316T52W	RD316T54W	RD316T55W	RD316T56W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000	RD320T51W	RD320T53W	RD320T52W	RD320T54W	RD320T55W	RD320T56W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200
2500	RD325T51W	RD325T53W	RD325T52W	RD325T54W	RD325T55W	RD325T56W	1600	RP6R25A160
							2000	RP6R25A200
							2500	RP6R25A250
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>								
1600	RDC316T51W	RDC316T53W	RDC316T52W	RDC316T54W	RDC316T55W	RDC316T56W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000	RDC320T51W	RDC320T53W	RDC320T52W	RDC320T54W	RDC320T55W	RDC320T56W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200
2500	RDC325T51W	RDC325T53W	RDC325T52W	RDC325T54W	RDC325T55W	RDC325T56W	1600	RP6R25A160
							2000	RP6R25A200
							2500	RP6R25A250



# 2.3

## Molded Case Circuit Breakers

### Series C

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#### 100% Rated Digitrip RMS 510 Circuit Breakers

The NEC allows the breaker to be rated at 100% of its frame size in an assembly, provided that 90°C wire is applied at 75°C ampacity. Order as individual components: breaker frame (which includes trip unit) and rating plug.

#### 100% Rated Digitrip RMS 510 Circuit Breakers

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only						Digitrip Rating Plug Only	
	L – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$ or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay ( $I^2t$ or Flat Response)						Rated Current ( $I_n$ )	Fixed Rating Plug Catalog Number
	LI	LS	LSI	LIG	LSG	LSIG		
Catalog Number								
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>								
1600	CRD316T51W	CRD316T53W	CRD316T52W	CRD316T54W	CRD316T55W	CRD316T56W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000 <sup>①</sup>	CRD320T51W	CRD320T53W	CRD320T52W	CRD320T54W	CRD320T55W	CRD320T56W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>								
1600	—	CRDC316T53W	CRDC316T52W	CRDC316T54W	CRDC316T55W	CRDC316T56W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000 <sup>①</sup>	CRDC320T51W	CRDC320T53W	CRDC320T52W	CRDC320T54W	CRDC320T55W	CRDC320T56W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200

**Note**

① Includes B2016RDL rear connectors.

**Digitrip RMS 610 Electronic Circuit Breakers with Interchangeable Rating Plugs**

Order as individual components: breaker frame (which includes trip unit) and rating plug.

**Digitrip RMS 610 Electronic Circuit Breakers with Interchangeable Rating Plugs**

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only						Digitrip Rating Plug Only	
	L – Adjustable Long Delay Pickup (I <sub>n</sub> ) with Adjustable Long Delay Time S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I <sup>2</sup> t or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay (I <sup>2</sup> t or Flat Response)						Rated Current (I <sub>n</sub> )	Fixed Rating Plug Catalog Number
	LI	LS	LSI	LIG	LSG	LSIG		
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>								
1600	RD316T61W	RD316T63W	RD316T62W	RD316T64W	RD316T65W	RD316T66W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000	RD320T61W	RD320T63W	RD320T62W	RD320T64W	RD320T65W	RD320T66W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200
2500	RD325T61W	RD325T63W	RD325T62W	RD325T64W	RD325T65W	RD325T66W	1600	RP6R25A160
							2000	RP6R25A200
							2500	RP6R25A250
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>								
1600	RDC316T61W	RDC316T63W	RDC316T62W	RDC316T64W	RDC316T65W	RDC316T66W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000	RDC320T61W	RDC320T63W	RDC320T62W	RDC320T64W	RDC320T65W	RDC320T66W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200
2500	RDC325T61W	RDC325T63W	RDC325T62W	RDC325T64W	RDC325T65W	RDC325T66W	1600	RP6R25A160
							2000	RP6R25A200
							2500	RP6R25A250



**Digitrip RMS 810 Electronic Circuit Breakers with Interchangeable Rating Plugs**

Order as individual components: breaker frame (which includes trip unit) and rating plug.

**Digitrip RMS 810 Electronic Circuit Breakers with Interchangeable Rating Plugs**

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only						Digitrip Rating Plug Only	
	L – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$ or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay ( $I^2t$ or Flat Response)						Rated Current ( $I_n$ )	Fixed Rating Plug Catalog Number
	LI	LS	LSI	LIG	LSG	LSIG		
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>								
1600	RD316T81W	RD316T83W	RD316T82W	RD316T84W	RD316T85W	RD316T86W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000	RD320T81W	RD320T83W	RD320T82W	RD320T84W	RD320T85W	RD320T86W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200
2500	RD325T81W	RD325T83W	RD325T82W	RD325T84W	RD325T85W	RD325T86W	1600	RP6R25A160
							2000	RP6R25A200
							2500	RP6R25A250
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>								
1600	RDC316T81W	RDC316T83W	RDC316T82W	RDC316T84W	RDC316T85W	RDC316T86W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000	RDC320T81W	RDC320T83W	RDC320T82W	RDC320T84W	RDC320T85W	RDC320T86W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200
2500	RDC325T81W	RDC325T83W	RDC325T82W	RDC325T84W	RDC325T85W	RDC325T86W	1600	RP6R25A160
							2000	RP6R25A200
							2500	RP6R25A250

# 2.3

## Molded Case Circuit Breakers

### Series C

2

#### 100% Rated Digitrip RMS 810 Circuit Breakers

The NEC allows the breaker to be rated at 100% of its frame size in an assembly, provided that 90°C wire is applied at 75°C ampacity. Order as individual components: breaker frame (which includes trip unit) and rating plug.

#### 100% Rated Digitrip RMS 810 Circuit Breakers

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only						Digitrip Rating Plug Only	
	L – Adjustable Long Delay Pickup (I <sub>n</sub> ) with Adjustable Long Delay Time S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I <sup>2</sup> t or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay (I <sup>2</sup> t or Flat Response)						Rated Current (I <sub>n</sub> )	Fixed Rating Plug Catalog Number
	LI	LS	LSI	LIG	LSG	LSIG		
Catalog Number								
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>								
1600	CRD316T81W	CRD316T83W	CRD316T82W	CRD316T84W	CRD316T85W	CRD316T86W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000 <sup>①</sup>	CRD320T81W	CRD320T83W	CRD320T82W	CRD320T84W	CRD320T85W	CRD320T86W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>								
1600	CRDC316T81W	CRDC316T83W	CRDC316T82W	CRDC316T84W	CRDC316T85W	CRDC316T86W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000 <sup>①</sup>	CRDC320T81W	CRDC320T83W	CRDC320T82W	CRDC320T84W	CRDC320T85W	CRDC320T86W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200

**Note**

<sup>①</sup> Includes B2016RDL rear connectors.

**Digitrip RMS 910 Electronic Circuit Breakers with Interchangeable Rating Plugs**

Order as individual components: breaker frame (which includes trip unit) and rating plug.

**Digitrip RMS 910 Electronic Circuit Breakers with Interchangeable Rating Plugs**

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only						Digitrip Rating Plug Only	
	L – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$ or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay ( $I^2t$ or Flat Response)						Rated Current ( $I_n$ )	Fixed Rating Plug Catalog Number
	LI	LS	LSI	LIG	LSG	LSIG		
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>								
1600	RD316T91W	RD316T93W	RD316T92W	RD316T94W	RD316T95W	RD316T96W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000	RD320T91W	RD320T93W	RD320T92W	RD320T94W	RD320T95W	RD320T96W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200
2500	RD325T91W	RD325T93W	RD325T92W	RD325T94W	RD325T95W	RD325T96W	1600	RP6R25A160
							2000	RP6R25A200
							2500	RP6R25A250
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>								
1600	RDC316T91W	RDC316T93W	RDC316T92W	RDC316T94W	RDC316T95W	RDC316T96W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000	RDC320T91W	RDC320T93W	RDC320T92W	RDC320T94W	RDC320T95W	RDC320T96W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200
2500	RDC325T91W	RDC325T93W	RDC325T92W	RDC325T94W	RDC325T95W	RDC325T96W	1600	RP6R25A160
							2000	RP6R25A200
							2500	RP6R25A250

# 2.3

## Molded Case Circuit Breakers

### Series C

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#### 100% Rated Digitrip RMS 910 Circuit Breakers

The NEC allows the breaker to be rated at 100% of its frame size in an assembly, provided that 90°C wire is applied at 75°C ampacity. Order as individual components: breaker frame (which includes trip unit) and rating plug.

#### 100% Rated Digitrip RMS 910 Circuit Breakers

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only						Digitrip Rating Plug Only	
	L – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$ or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay ( $I^2t$ or Flat Response)						Rated Current ( $I_n$ )	Fixed Rating Plug Catalog Number
	LI	LS	LSI	LIG	LSG	LSIG		
Catalog Number								
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>								
1600	CRD316T91W	CRD316T93W	CRD316T92W	CRD316T94W	CRD316T95W	CRD316T96W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000 <sup>①</sup>	CRD320T91W	CRD320T93W	CRD320T92W	CRD320T94W	CRD320T95W	CRD320T96W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>								
1600	CRDC316T91W	CRDC316T93W	CRDC316T92W	CRDC316T94W	CRDC316T95W	CRDC316T96W	800	RP6R16A080
							1000	RP6R16A100
							1000	RP6R16A100
							1200	RP6R16A120
2000 <sup>①</sup>	CRDC320T91W	CRDC320T93W	CRDC320T92W	CRDC320T94W	CRDC320T95W	CRDC320T96W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200

**Note**

① Includes B2016RDL rear connectors.

**Digitrip OPTIM Electronic Circuit Breakers with Interchangeable Rating Plugs**

Order as individual components: breaker frame (which includes trip unit) and rating plug.

**Digitrip OPTIM Electronic Circuit Breakers with Interchangeable Rating Plugs**

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only		Digitrip OPTIM Rating Plug Only	
	LSIA 1050 Catalog Number	LSIG 1050 Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>				
1600	RD316T107W	RD316T106W	800	ORPR16A080
			1000	ORPR16A100
			1200	ORPR16A120
			1600	ORPR16A160
2000	RD320T107W	RD320T106W	1000	ORPR20A100
			1200	ORPR20A120
			1600	ORPR20A160
			2000	ORPR20A200
2500	RD325T107W	RD325T106W	1600	ORPR25A160
			2000	ORPR25A200
			2500	ORPR25A250
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>				
1600	RDC316T107W	RDC316T106W	800	ORPR16A080
			1000	ORPR16A100
			1200	ORPR16A120
			1600	ORPR16A160
2000	RDC320T107W	RDC320T106W	1000	ORPR20A100
			1200	ORPR20A120
			1600	ORPR20A160
			2000	ORPR20A200
2500	RDC325T107W	RDC325T106W	1600	ORPR25A160
			2000	ORPR25A200
			2500	ORPR25A250



# 2.3

## Molded Case Circuit Breakers

### Series C

#### 100% Rated 600 Volts AC Digitrip OPTIM Circuit Breakers with Interchangeable Rating Plugs

Order as individual components: breaker frame (which includes trip unit) and rating plug.

2

#### 100% Rated 600 Volts AC Digitrip OPTIM Circuit Breakers with Interchangeable Rating Plugs

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only		Digitrip OPTIM Rating Plug Only	
	LSIA 1050 Catalog Number	LSIG 1050 Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>				
1600	CRD316T107W	CRD316T106W	800	ORPR16A080
			1000	ORPR16A100
			1200	ORPR16A120
			1600	ORPR16A160
2000 ①	CRD320T107W	CRD320T106W	1000	ORPR20A100
			1200	ORPR20A120
			1600	ORPR20A160
			2000	ORPR20A200
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>				
1600	CRDC316T107W	CRDC316T106W	800	ORPR16A080
			1000	ORPR16A100
			1200	ORPR16A120
			1600	ORPR16A160
2000 ①	CRDC320T107W	CRDC320T106W	1000	ORPR20A100
			1200	ORPR20A120
			1600	ORPR20A160
			2000	ORPR20A200

#### Molded Case Switches

Refer to Eaton for UL listed, series tested Molded Case Switch application data.

#### Type RD—High Instantaneous (K)

Continuous Ampere Rating at 40°C	Complete without Terminals	
	Three-Pole Catalog Number	Four-Pole Catalog Number
1600	RD316WK	RD416WK
2000	RD320WK	RD420WK

#### Notes

① Includes B2016RDL rear connectors.

Molded case switch may trip above 17,500 amperes.

## Accessories Selection Guide and Ordering Information

### Line and Load Terminals

Line and load terminals provide wire connecting capabilities for specific ranges of continuous current ratings and wire types. All terminals comply with Underwriters Laboratories Standards UL 486A and UL 486B and CSA C22.2 No. 65M. Unless otherwise specified, R-Frame circuit breaker line load terminals are shipped separately for field installation.

### Ordering Information

R-Frame circuit breakers have Cu/Al terminals as standard and Cu only terminals as an option. Specify if factory installation is required.

### Line and Load Terminals

Maximum Breaker Amperes	Terminal Body Material	Wire Type	Hardware	AWG/kcmil Wire Range/ No. Conductors	Metric Wire Range mm <sup>2</sup>	Catalog Number
<b>Wire Terminals</b>						
1600	Aluminum	Cu/Al	English	500–1000 (4)	300–500	<b>TA1600RD</b>
1600	Copper	Cu	English	1–600 (4)	50–300	<b>T1600RD</b>
2000	Aluminum	Cu/Al	English	2–600 (6)	35–300	<b>TA2000RD</b> <sup>①</sup>
<b>Rear Connectors</b>						
2000	Copper	—	English	—	—	<b>B2016RD</b>
2000	Copper	—	English	—	—	<b>B2016RDL</b> <sup>②</sup>
2500	Copper	—	English	—	—	<b>B2500RD</b> <sup>③</sup>

### Notes

- ① Catalog Number includes bus connection, terminals and hardware for either line side or load side of three-pole breaker.
- ② For use with 100% rated 1600A and 2000A frame. Do not order separately unless for replacement purposes. Included in breaker carton when 100% rated device is ordered.
- ③ For use with 2500A frame. Do not order separately unless for replacement purposes. Included in breaker carton when 2500A breaker is ordered.

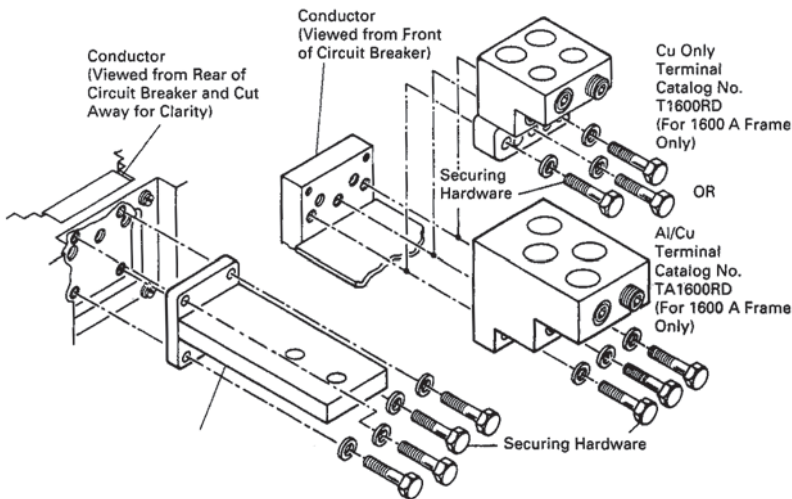
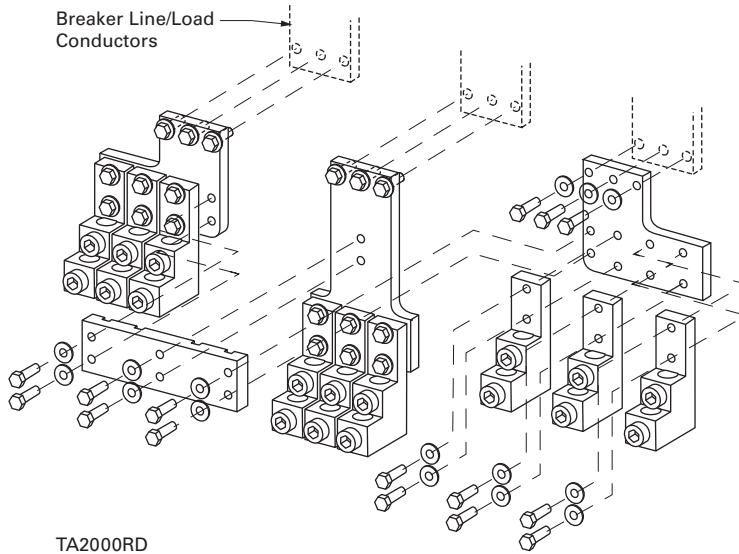
# 2.3

## Molded Case Circuit Breakers

### Series C

#### Mounting Hardware

2



**Accessories**

**Allowable Accessory Combinations**

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

**RD Frame Accessories**

Description	Reference Page	Three-Pole			Four-Pole			Neu.
		Left	Center	Right	Left	Center	Right	
<b>Internal Accessories</b> ①								
Alarm lockout (Make/Break)	V4-T2-271			■			■	
Alarm lockout (2Make/2Break)	V4-T2-271			■			■	
Auxiliary switch (2A, 2B)	V4-T2-271			■			■	
Auxiliary switch (4A, 4B)	V4-T2-271			■			■	
Shunt trip—standard	V4-T2-279			■			■	
Shunt trip—low energy	V4-T2-280			■			■	
Undervoltage release mechanism	V4-T2-287			■			■	
Accessory terminal block ②	V4-T2-288			■				■
<b>External Accessories</b>								
Base mounting hardware	V4-T2-306							
Padlockable handle lock hasp	V4-T2-309		●			●		
Key interlock kit	V4-T2-311	■	■	■		■		
Walking beam interlock	V4-T2-312							
Electrical (motor) operator	V4-T2-314	■	■	■		■		
Handle mechanisms	V4-T2-419	■	■	■		■		
Handle extension ③	V4-T2-434		■			■		
<b>OPTIM System Components</b>								
Breaker interface module (BIM)	V4-T2-320	●	●	●				
Digitrip OPTIMizer	V4-T2-320	●	●	●				
Auxiliary power module	V4-T2-320	●	●	●				
<b>Modifications (Refer to Eaton)</b>								
Special calibration	—	●	●	●	●	●	●	●
Moisture fungus treatment	V4-T2-110	●	●	●	●	●	●	●
Freeze-tested circuit breakers	—	●	●	●	●	●	●	●
Marine/naval application	—	●	●	●	●	●	●	●

**Legend**

- Applicable in indicated pole position
- Accessory available/modification available

**Notes**

- ① All accessories mount in the RH cavity which will accept one each shunt trip, UVR, auxiliary switch and alarm switch.
- ② Mounts outside breaker.
- ③ Included with breaker.

## Technical Data and Specifications

## 2

UL 489/CSA Interrupting Capacity Ratings <sup>①</sup>

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)			
		Volts AC (50/60 Hz)			
		240	277	480	600
RD	3, 4	125	—	65	50
CRD <sup>②</sup>	3	125	—	65	50
RDC	3, 4	200	—	100	65
CRDC <sup>②</sup>	3	200	—	100	65

IEC 947-2 Interrupting Capacity Ratings <sup>①</sup>

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)		
		Volts AC (50/60 Hz)		
		240	415	690
<b>RD</b>				
$I_{cu}$	3, 4	135	70	25
$I_{cs}$	3, 4	100	50	13
<b>RDC</b>				
$I_{cu}$	3, 4	200	100	35
$I_{cs}$	3, 4	100	50	18

**Notes**

① Utilization Category A circuit breakers.

② 100% rated breakers.

See **Page V4-T2-247** for Trip Unit Specifications.

**Specifications****R-Frame Digitrip**

Trip Unit Type	Digitrip RMS 510	Digitrip RMS 610	Digitrip RMS 810	Digitrip RMS 910	Digitrip OPTIM 1050
rms sensing	Yes	Yes	Yes	Yes	Yes
<b>Breaker Type</b>					
Frame	R	R	R	R	R
Ampere range	800–2500A	800–2500A	800–2500A	800–2500A	800–2500A
Interrupting rating at 480 volts	65, 100 (kA)	65, 100 (kA)	65, 100 (kA)	65, 100 (kA)	65, 100 (kA)
<b>Protection</b>					
Ordering options	LI, LS, LSI, LIG, LSG, LSIG	LI, LS, LSI, LIG, LSG, LSIG	LI, LS, LSI, LIG, LSG, LSIG	LI, LS, LSI, LIG, LSG, LSIG	LSI(A), LISG
Fixed rated plug ( $I_n$ )	Yes	Yes	Yes	Yes	Yes
Overtemperature trip	Yes	Yes	Yes	Yes	Yes
<b>Long Delay Protection (L)</b>					
Adjustable rating plug ( $I_n$ )	No	No	No	No	No
Long delay pickup	0.5–1.0 x ( $I_n$ )	0.5–1.0 x ( $I_n$ )	0.5–1.0 x ( $I_n$ )	0.5–1.0 x ( $I_n$ )	0.4–1.0 x ( $I_n$ )
Long delay time $I^2t$	2–24 seconds	2–24 seconds	2–24 seconds	2–24 seconds	2–24 seconds
Long delay time $I^4t$	No	No	No	No	1–5 Seconds
Long delay thermal memory	Yes	Yes	Yes	Yes	Yes
High load alarm	No	0.85 x $I_r$	0.85 x $I_r$	0.85 x $I_r$	0.5–1.0 x $I_r$
<b>Short Delay Protection (S)</b>					
Short delay pickup	200–600% S1 and S2 x ( $I_r$ )	200–600% S1 and S2 x ( $I_r$ )	200–600% S1 and S2 x ( $I_r$ )	200–600% S1 and S2 x ( $I_r$ )	150–800% x ( $I_r$ ) <sup>②</sup>
Short delay time $I^2t$	100–500 ms	100–500 ms	100–500 ms	100–500 ms	100–500 ms
Short delay time flat	100–500 ms	100–500 ms	100–500 ms	100–500 ms	100–500 ms
Short delay time zone selective interlocking	Yes	Yes	Yes	Yes	Yes
<b>Instantaneous Protection (I)</b>					
Instantaneous pickup	200–600% M1 and M2 x ( $I_n$ )	200–600% M1 and M2 x ( $I_n$ )	200–600% M1 and M2 x ( $I_n$ )	200–600% M1 and M2 x ( $I_n$ )	200–800% x ( $I_n$ ) <sup>②</sup>
Discriminator	Yes <sup>③</sup>	Yes <sup>③</sup>	Yes <sup>③</sup>	Yes <sup>③</sup>	Yes
Instantaneous override	Yes	Yes	Yes	Yes	Yes
<b>Ground Fault Protection (G)</b>					
Ground fault alarm <sup>④</sup>	No	No	No	No	25–100% x ( $I_n$ )
Ground fault pickup <sup>④</sup>	25–100% x ( $I_s$ )	25–100% x ( $I_s$ )	25–100% x ( $I_s$ )	25–100% x ( $I_s$ )	25–100% x ( $I_n$ )
Ground fault delay $I^2t$	100–500 ms	100–500 ms	100–500 ms	100–500 ms	100–500 ms
Ground fault delay flat	100–500 ms	100–500 ms	100–500 ms	100–500 ms	100–500 ms
Ground fault zone selective interlocking	Yes	Yes	Yes	Yes	Yes
Ground fault thermal memory	Yes	Yes	Yes	Yes	Yes

**Legend**

BIM = Breaker Interface Module  
(A) = GF Alarm  
 $I_s$  = Sensor Rating  
 $I_n$  = Rating Plug  
 $I_r$  = Long Delay Pickup Setting x  $I_n$

**Notes**

- ① Except 2500 ampere frame is 200–600%.  
② Varies by frame.  
③ LS/LSG only.  
④ Not to exceed 1200 amperes.

## R-Frame Digitrip, continued

Trip Unit Type	Digitrip RMS 510	Digitrip RMS 610	Digitrip RMS 810	Digitrip RMS 910	Digitrip OPTIM 1050
<b>System Diagnostics</b>					
Status LEDs	Yes	Yes	Yes	Yes	Yes
Cause of trip LEDs	Yes	Yes	Yes	Yes	Yes
Magnitude of trip information	No	Yes	Yes	Yes	Yes
Remote signal contacts	No	Yes	Yes	Yes	Yes
<b>System Monitoring</b>					
Digital display	No	Yes	Yes	Yes	Yes <sup>①</sup>
Current	No	Yes	Yes	Yes	Yes
Voltage	No	No	No	Yes	No
Power and energy	No	No	Yes	Yes	Yes
Power quality—harmonics	No	No	No	Yes	Yes
Power factor	No	No	Yes (over Eaton PowerNet only)	Yes	Yes
<b>Communications</b>					
Eaton PowerNet	No	No	Yes	Yes	Yes
<b>Testing</b>					
Testing method	Integral	Integral	Integral	Integral	OPTIMizer, BIM, PowerNet

**Legend**

BIM = Breaker Interface Module  
(A) = GF Alarm  
 $I_s$  = Sensor Rating  
 $I_n$  = Rating Plug  
 $I_r$  = Long Delay Pickup Setting x  $I_n$

**Note**

<sup>①</sup> By OPTIMizer/BIM.

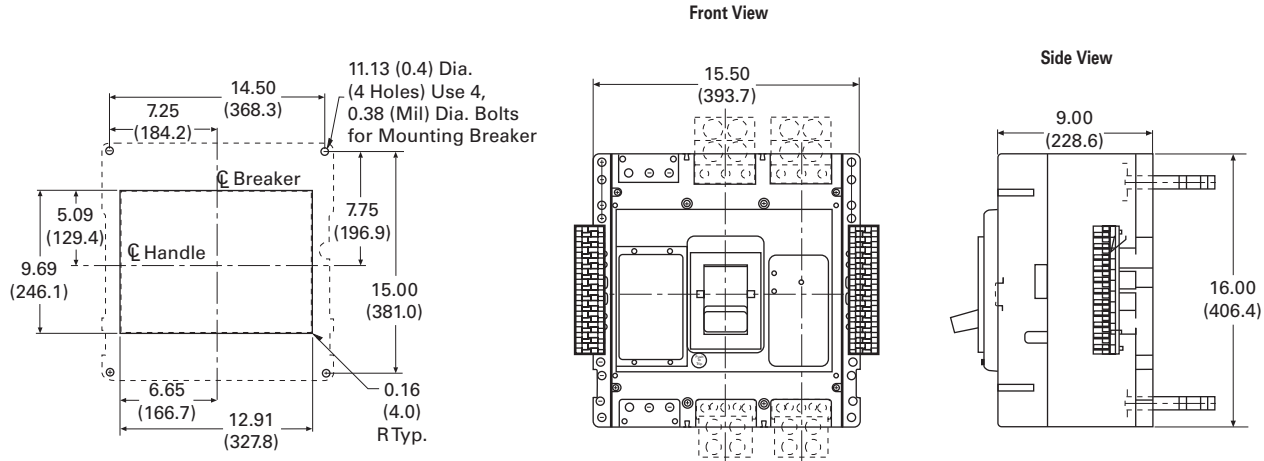
**Dimensions and Weights**

Dimensions in Inches (mm)

**RD Frame**

Number of Poles	Width	Height	Depth
3	15.50 (393.7)	16.00 (406.4)	9.75 (247.7)
4	20.00 (508.0)	16.00 (406.4)	9.75 (247.7)

**RD-Frame, Three-Pole, 1600 and 2000 Amperes**



Approximate Shipping Weight in Lbs (kg)

**RD Frame**

Breaker Type	Complete Breaker	
	Three-Pole	Four-Pole
<b>1600 Amperes</b>		
RD, CRD ①, RDC, CRDC ①	102 (46.3)	135 (61.2)
<b>2000 Amperes</b>		
RD, RDC	102 (46.3)	135 (61.2)
CRD, CRDC	130 (59.0)	175 (79.4)
<b>2500 Amperes</b>		
RD, RDC	135 (61.2)	182 (82.6)

**Note**

① No four-pole for CRD and CRDC.



#### Motor Circuit Protectors



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### Motor Circuit Protectors (MCP)

#### Product Description

Designated as Eaton’s Types GMCP and HMCP, the instantaneous-only motor circuit protector (MCP) is available in ratings from 3A to 1200A for motor starter sizes 0 through 8.

An innovative design of internal components allows higher MCP-starter combination interrupting ratings. The MCP is marked to permit proper electrical application within the assigned equipment ratings.

#### Standards and Certifications

The MCP is designed to comply with the applicable requirements of Underwriters Laboratories Standard UL 489, Canadian Standards Association Standard C22.2 No. 5.1, and International Electrotechnical Commission Recommendations IEC 157-1.

The MCP is a recognized component (UL File E7819) and complies with the applicable requirements of Underwriters Laboratories Standard UL 489. It is also designed to comply with the applicable requirements of Canadian Standards Association Standard C22.2 No. 5.1, International Electrotechnical Commission Recommendations IEC 157-1, and nameplates bear the CE marking.

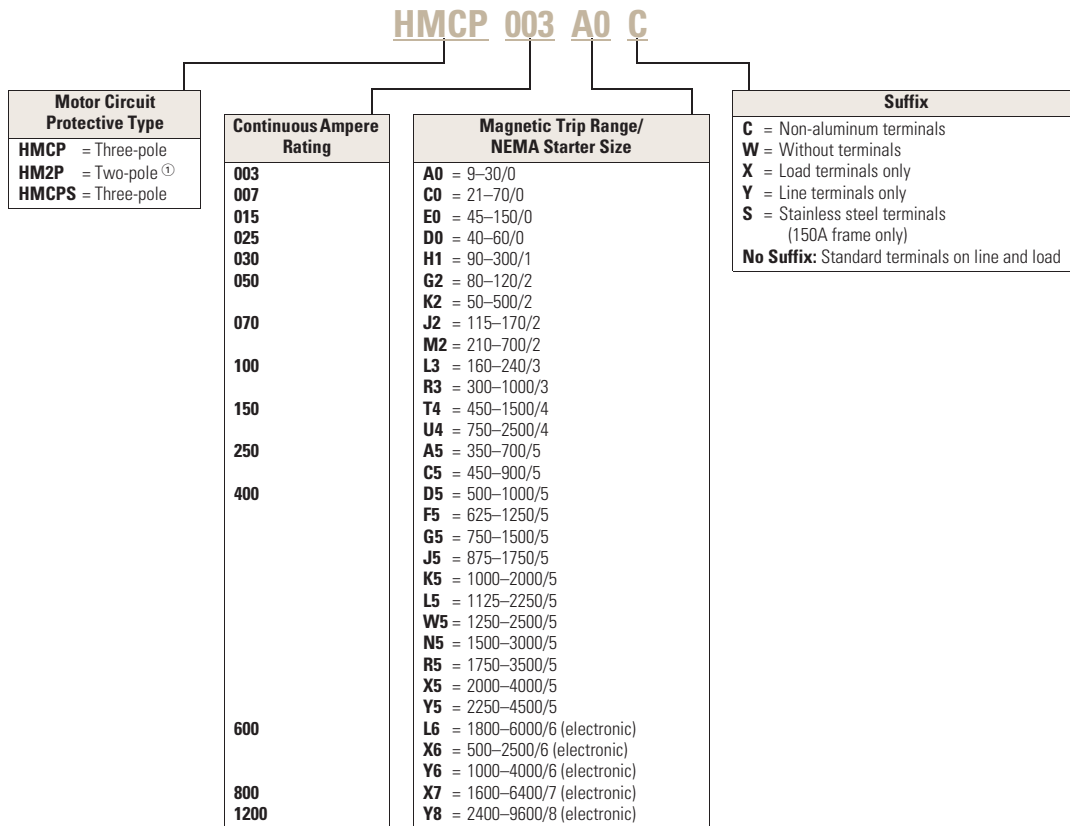


**Note:** Interrupting ratings are dependent on starter it is used with.

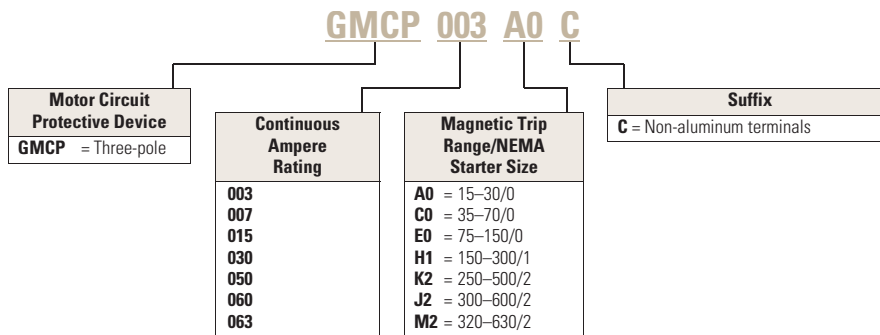
**Catalog Number Selection**

This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

**Motor Circuit Protector**



**Motor Circuit Protector**



**Note**  
<sup>①</sup> On J- and K-Frame HMCPs only.

# 2.3

## Molded Case Circuit Breakers

### Series C

#### Product Selection

##### G-Frame

2

##### 480 Vac Maximum, 600Y/347 Vac

NEMA Starter Size	Continuous Amperes	Cam Setting	Motor Full Load Current Amperes (FLA) <sup>①</sup>	MCP Trip Setting	MCP Catalog Number
0	3	A	1.1–1.2	15	GMCP003A0C
		B	1.3–1.5	18	
		C	1.6–1.7	21	
		D	1.8–1.9	24	
		E	2.0–2.2	27	
		F	2.3–2.5	30	
0	7	A	2.6–3.1	35	GMCP007C0C
		B	3.2–3.6	42	
		C	3.7–3.9	49	
		D	4.3–4.7	56	
		E	4.8–5.2	63	
		F	5.3–5.7	70	
0	15	A	5.7–6.8	75	GMCP015E0C
		B	6.9–7.9	90	
		C	8.0–9.1	105	
		D	9.2–10.3	120	
		E	10.4–11.4	135	
		F	11.5–12.6	150	
1	30	A	11.5–13.7	150	GMCP030H1C
		B	13.8–16.0	180	
		C	16.1–18.3	210	
		D	18.4–20.6	240	
		E	20.7–22.9	270	
		F	23.0–25.2	300	
2	50	A	19.3–22.9	250	GMCP050K2C
		B	23.0–26.8	300	
		C	26.9–30.6	350	
		D	30.7–34.5	400	
		E	34.6–38.3	450	
		F	38.4–42.1	500	
3	60	A	23.1–27.5	300	GMCP060J2C
		B	27.7–32.2	360	
		C	32.3–36.7	420	
		D	36.9–41.4	480	
		E	41.5–46.0	540	
		F	46.2–50.5	600	
3	63	A	24.2–32.1	320	GMCP063M2C
		B	29.1–34.8	380	
		D	38.8–46.4	500	
		E	43.6–48.9	570	
		F	48.5–53.7	630	

#### Notes

<sup>①</sup> Motor FLA ranges are typical. The corresponding trip setting is at 13 x the minimum FLA value shown. Where a 13 x setting is required for an intermediate FLA value, alternate Cam settings and/or MCP ratings should be used.

All GMCP 3–63A come with line and load steel body terminals for Cu only wire. Refer to **Page V4-T2-116** under Optional Terminal Types.

UL recognized and CSA approved.

## Accessories

### Modifications for GMCP

Internal accessories must be factory installed.

### Internal Accessories <sup>①</sup>

Type Accessory	Electrical Ratings			Contact Arrangement	Factory Suffix	Style Number
	Volts	Frequency	Amperes			
Shunt trip <sup>②</sup>	120	50/60 Hz	1.1	—	S5	1373D62G18
Shunt trip <sup>②</sup>	240	50/60 Hz	2.1	—	S6	1373D62G19
Auxiliary switch <sup>③</sup>	240	50/60 Hz	6.0	1A/1B	A3	1288C74G03
Auxiliary switch <sup>③</sup>	240	50/60 Hz	6.0	2A/2B	A6	1288C73G03
Alarm switch <sup>③</sup>	240	50/60 Hz	6.0	Make/Break	B3	1288C75G03
Auxiliary switch/alarm switch combination <sup>③</sup>	240	50/60 Hz	6.0	1A/1B Make/Break	B13	1288C76G09

### External Mounted Accessories



Description	Number Units in Package	Style Number
Lock dog (non-padlockable)	1	1294C01H01
Mounting hardware	1	624B375G23
DIN rail adapter <sup>④</sup>	10	1225C79G02

### Modifications for HMCP

See Internal Accessories starting on **Page V4-T2-268**.

### Handle Mechanisms for Series C Frames

#### Kits Only (Kit Includes Shaft, Mechanism and Handle)—GMCP-Frame

	Description	Rating Type		GMCP-Frame Catalog Number
		NEMA	IP	
 <b>S01 Blue Handle</b>	S01 blue handle, 12-inch shaft	1/3R/12	54	GMHMVD12B / 68C6039G05
		4/4X	65	GMHMVD12BX / 68C6039G07
 <b>S01 Red Handle</b>	S01 red handle, 12-inch shaft	1/3R/12	54	GMHMVD12R / 68C6039G06
		4/4X	65	GMHMVD12RX / 68C6039G08

### Direct (Close-Coupled) Handle Mechanisms

#### G Direct <sup>⑤</sup>

Frame	Black Handle		Yellow Handle	
	With Shroud Catalog Number	Without Shroud Catalog Number	With Shroud Catalog Number	Without Shroud Catalog Number
GMCP	HRGMC1S	HRGMC10	HRGMC3S	HRGMC30

#### Notes

- ① Only one accessory may be installed in GMCP.
- ② LH only.
- ③ RH only.
- ④ For use with standard 35 mm DIN rail such as, 35 x 7.5 or 15 mm per DIN EN50022.
- ⑤ Suitable for use on two- or three-pole G-Frame.

No UVR available on GMCP.

# 2.3

## Molded Case Circuit Breakers

### Series C

#### F-Frame

2

#### 600 Vac Maximum, 250 Vdc Maximum

NEMA Starter Size	Cont. Amps	Cam Setting	Motor Full Load Current Amperes (FLA) ①	MCP Trip Setting ②	MCP Catalog Number
0	3	A	0.69–0.91	9	<b>HMCP003A0C</b>
		B	0.92–1.0	12	
		C	1.1–1.2	15	
		D	1.3–1.5	18	
		E	1.6–1.7	21	
		F	1.8–1.9	24	
		G	2.0–2.2	27	
		H	2.3–2.5	30	
0	7	A	1.5–2.0	21	<b>HMCP007C0C</b>
		B	2.1–2.5	28	
		C	2.6–3.1	35	
		D	3.2–3.6	42	
		E	3.7–3.9	49	
		F	4.3–4.7	56	
		G	4.8–5.2	63	
		H	5.3–5.7	70	
0	15	A	3.4–4.5	45	<b>HMCP015E0C</b>
		B	4.6–5.6	60	
		C	5.7–6.8	75	
		D	6.9–7.9	90	
		E	8.0–9.1	105	
		F	9.2–10.3	120	
		G	10.4–11.4	135	
		H	11.5–12.6	150	
1	30	A	6.9–9.1	90	<b>HMCP030H1C</b>
		B	9.2–11.4	120	
		C	11.5–13.7	150	
		D	13.8–16.0	180	
		E	16.1–18.3	210	
		F	18.4–20.6	240	
		G	20.7–22.9	270	
		H	23.0–25.2	300	
2	50	A	11.5–15.2	150	<b>HMCP050K2C</b>
		B	15.3–19.1	200	
		C	19.2–22.9	250	
		D	23.0–26.8	300	
		E	26.9–30.6	350	
		F	30.7–4.5	400	
		G	34.6–38.3	450	
		H	38.4–42.1	500	

#### 600 Vac Maximum, 250 Vdc Maximum, continued

NEMA Starter Size	Cont. Amps	Cam Setting	Motor Full Load Current Amperes (FLA) ①	MCP Trip Setting ②	MCP Catalog Number
2	70	A	16.1–21.4	210	<b>HMCP070M2C</b>
		B	21.5–26.8	280	
		C	26.9–32.2	350	
		D	32.3–37.5	420	
		E	37.6–42.9	490	
		F	43.0–48.3	560	
		G	48.4–53.7	630	
		H	53.8–59.1	700	
3	100	A	23.0–30.6	300	<b>HMCP100R3C</b>
		B	30.7–38.3	400	
		C	38.4–46.0	500	
		D	46.1–53.7	600	
		E	53.8–61.4	700	
		F	61.5–69.1	800	
		G	69.2–76.8	900	
		H	76.9–84.5	1000	
4	150	A	34.6–46.0	450	<b>HMCP150T4C</b>
		B	46.1–57.5	600	
		C	57.6–69.1	750	
		D	69.2–80.6	900	
		E	69.2–80.6	900	
		F	80.7–92.2	1050	
		G	92.3–103.7	1200	
		H	103.8–115.2	1350	
4	150	A	57.0–75.0	750	<b>HMCP150U4C</b>
		B	76.0–95.0	1000	
		C	96.0–114.0	1250	
		D	115.0–130.7	1500	
		E	③	1750	
		F	③	2000	
		G	③	2250	
		H	③	2500	

#### Notes

- ① Motor FLA ranges are typical. The corresponding trip setting is at 13 x the minimum FLA value shown. Where a 13 x setting is required for an intermediate FLA value, alternate Cam settings and/or MCP ratings should be used.
- ② For DC applications, actual trip levels are approximately 40% higher than values shown.
- ③ Settings above 130 amperes are for special applications. NEC Article 430.110(a) requires the ampere rating of the disconnecting means to be not less than 115% of the motor full load ampere rating.

HMCP 3–100A come with line and load steel body terminals, 3T100FB. HMCP 150A come with line and load steel body terminals, 3T150FB.

**Special Low Magnetic Protection Application MCP****600 Vac Maximum, 250 Vdc Maximum**

Cont. Amps	Cam Setting	MCP Trip Setting <sup>①</sup>	MCP Catalog Number
25	A	40	<b>HMCP025D0C</b>
	B	43	
	D	49	
	E	52	
	F	55	
	G	58	
	H	60	
	50	A	
B		87	
C		93	
D		98	
E		103	
F		109	
G		115	
H		120	
70	A	115	<b>HMCP070J2C</b>
	B	122	
	C	130	
	D	139	
	E	145	
	F	153	
	G	160	
	H	170	
100	A	160	<b>HMCP100L3C</b>
	B	174	
	C	185	
	D	196	
	E	207	
	F	218	
	G	229	
	H	240	

**Notes**

<sup>①</sup> For DC applications, actual trip levels are approximately 40% higher than values shown.

HMCP 25–100A come with line and load steel body terminals, 3T100FB.

# 2.3

## Molded Case Circuit Breakers

### Series C

#### MCPs for Application with Motor Starters Equipped with Electronic Overload Relays

2

#### 600 Vac Maximum, 250 Vdc Maximum

NEMA Starter Size	Cont. Amps	Cam Setting	Motor Full Load Current Amperes (FLA) ①	MCP Trip Setting ②	MCP Catalog Number
0	3	A	0.69–0.91	9	<b>HMCP5003A0C</b>
		B	0.92–1.0	12	
		C	1.1–1.2	15	
		D	1.3–1.5	18	
		E	1.6–1.7	21	
		F	1.8–1.9	24	
		G	2.0–2.2	27	
		H	2.3–2.5	30	
0	7	A	1.5–2.0	21	<b>HMCP5007C0C</b>
		B	2.1–2.5	28	
		C	2.6–3.1	35	
		D	3.2–3.6	42	
		E	3.7–3.9	49	
		F	4.3–4.7	56	
		G	4.8–5.2	63	
		H	5.3–5.7	70	
0	15	A	3.4–4.5	45	<b>HMCP5015E0C</b>
		B	4.6–5.6	60	
		C	5.7–6.8	75	
		D	6.9–7.9	90	
		E	8.0–9.1	105	
		F	9.2–10.3	120	
		G	10.4–11.4	135	
		H	11.5–12.6	150	
1	30	A	6.9–9.1	90	<b>HMCP5030H1C</b>
		B	9.2–11.4	120	
		C	11.5–13.7	150	
		D	13.8–16.0	180	
		E	16.1–18.3	210	
		F	18.4–20.6	240	
		G	20.7–22.9	270	
		H	23.0–25.2	300	
2	50	A	11.5–15.2	150	<b>HMCP5050K2C</b>
		B	15.3–19.1	200	
		C	19.2–22.9	250	
		D	23.0–26.8	300	
		E	26.9–30.6	350	
		F	30.7–34.5	400	
		G	34.6–38.3	450	
		H	38.4–42.1	500	

#### 600 Vac Maximum, 250 Vdc Maximum, continued

NEMA Starter Size	Cont. Amps	Cam Setting	Motor Full Load Current Amperes (FLA) ①	MCP Trip Setting ②	MCP Catalog Number
3	100	A	23.0–30.6	300	<b>HMCP5100R3C</b>
		B	30.7–38.3	400	
		C	38.4–46.0	500	
		D	46.1–53.7	600	
		E	53.8–61.4	700	
		F	61.5–69.1	800	
		G	69.2–76.8	900	
		H	76.9–84.5	1000	
4	150	A	34.6–46.0	450	<b>HMCP5150T4C</b>
		B	46.1–57.5	600	
		C	57.6–69.1	750	
		D	69.2–80.6	900	
		E	80.7–92.2	1050	
		F	92.3–103.7	1200	
		G	103.8–115.2	1350	
		H	115.3–126.7	1500	
4	150	A	57.0–75.0	750	<b>HMCP5150U4C</b>
		B	76.0–95.0	1000	
		C	96.0–114.0	1250	
		D	115.0–130.7	1500	
		E	③	1750	
		F	③	2000	
		G	③	2250	
		H	③	2500	

#### Notes

- ① Motor FLA ranges are typical. The corresponding trip setting is at 13 x the minimum FLA value shown. Where a 13 x setting is required for an intermediate FLA value, alternate cam settings and/or MCP ratings should be used.
- ② For DC applications, actual trip levels are approximately 40% higher than values shown.
- ③ Settings above 130A are for special applications. NEC Article 430.110(a) requires the ampere rating of the disconnecting means to be not less than 115% of the motor full load ampere rating.

HMCP 25–100A come with line and load steel body terminals, 3T100FB.

HMCP 3–100A come with line and load steel body terminals, 3T100FB. HMCP 150A come with line and load steel body terminals, 3T150FB.

## J-Frame

## 600 Vac Maximum, 250 Vdc Maximum

NEMA Starter Size	Cont. Amps	Cam Setting	Motor Full Load Current Amperes (FLA) <sup>①</sup>	MCP Trip Setting <sup>②</sup>	MCP Catalog Number <sup>③</sup>
4	250	A	27.0–30.7	350	<b>HMCP250A5C</b>
		B	30.8–33.8	400	
		C	33.9–36.9	440	
5	250	D	37.0–40.3	480	
		E	40.4–43.8	525	
		F	43.9–46.9	570	
		G	47.0–50.7	610	
		H	47.0–50.7	660	
		I	47.0–50.7	700	
5	250	A	34.7–38.8	450	<b>HMCP250C5C</b>
		B	38.9–43.4	505	
		C	43.5–47.6	565	
		D	47.7–52.2	620	
		E	52.3–56.5	680	
		F	56.6–60.7	735	
		G	60.8–64.9	790	
		H	65.0–69.2	845	
		I	69.3–73.5	900	
5	250	A	38.5–43.4	500	<b>HMCP250D5C</b>
		B	43.5–48.0	565	
		C	48.1–53.0	625	
		D	53.1–57.6	690	
		E	57.7–62.3	750	
		F	62.4–67.3	810	
		G	67.4–71.9	875	
		H	72.0–76.9	935	
		I	77.0–81.6	1000	
5	250	A	48.1–53.8	625	<b>HMCP250F5C</b>
		B	53.9–59.9	700	
		C	60.0–66.1	780	
		D	66.2–72.3	860	
		E	72.4–78.4	940	
		F	78.5–83.8	1020	
		G	83.9–89.9	1090	
		H	90.0–96.1	1170	
		I	96.2–102.0	1250	
5	250	A	57.7–64.6	750	<b>HMCP250G5C</b>
		B	64.7–71.9	840	
		C	72.0–79.2	935	
		D	79.3–86.5	1030	
		E	86.6–93.8	1125	
		F	93.9–101.1	1220	
		G	101.2–108.4	1315	
		H	108.5–115.3	1410	
		I	115.4–122.4	1500	

## 600 Vac Maximum, 250 Vdc Maximum, continued

NEMA Starter Size	Cont. Amps	Cam Setting	Motor Full Load Current Amperes (FLA) <sup>①</sup>	MCP Trip Setting <sup>②</sup>	MCP Catalog Number <sup>③</sup>
5	250	A	67.4–75.3	875	<b>HMCP250J5C</b>
		B	75.4–83.8	980	
		C	83.9–92.3	1090	
		D	92.4–100.7	1200	
		E	100.8–109.2	1310	
		F	109.3–117.6	1420	
		G	117.7–126.1	1530	
		H	126.2–134.6	1640	
		I	134.7–142.8	1750	
5	250	A	77.0–86.6	1000	<b>HMCP250K5C</b>
		B	86.6–96.1	1125	
		C	96.2–105.7	1250	
		D	105.8–115.3	1375	
		E	115.4–124.9	1500	
		F	125.0–134.6	1625	
		G	134.7–144.2	1750	
		H	144.3–153.8	1875	
		I	153.9–163.3	2000	
5	250	A	86.6–97.3	1125	<b>HMCP250L5C</b>
		B	97.4–108.4	1265	
		C	108.5–118.8	1410	
		D	118.9–129.9	1545	
		E	130.0–140.7	1690	
		F	140.8–151.5	1830	
		G	151.6–162.3	1970	
		H	162.4–173.0	2110	
		I	173.1–183.6	2250	
5	250	A	96.2–108.0	1250	<b>HMCP250W5C</b>
		B	108.1–119.9	1405	
		C	120.0–132.3	1560	
		D	132.4–144.2	1720	
		E	144.3–156.1	1875	
		F	156.2–168.0	2030	
		G	168.1–179.9	2185	
		H	180.0–192.3	2340	
		I	192.4–204.0	2500	

## Notes

- <sup>①</sup> Motor FLA ranges are typical. The corresponding trip setting is at 13 times the minimum FLA value shown. Where a 13 times setting is required for an intermediate FLA value, alternate cam settings and/or MCP ratings should be used.
- <sup>②</sup> For DC applications, actual trip levels are approximately 40% higher than values shown.
- <sup>③</sup> Three-pole catalog numbers shown. Two-pole catalog numbers begin with **HM2P** in place of **HMCP**.

All HMCP and HM2P 250A come with line and load steel body terminals, T250KB. (With suffix "C," without "C" comes with TA250KB.)



# 2.3

## Molded Case Circuit Breakers

### Series C

#### K-Frame

#### 600 Vac Maximum, 250 Vdc Maximum

NEMA Starter Size	Cont. Amps	Cam Setting	Motor Full Load Current Amperes (FLA) ①	MCP Trip Setting ②	MCP Catalog Number ③
4	400	A	27.0–30.7	350	<b>HMCP400A5C</b>
		B	30.8–33.8	400	
		C	33.9–36.9	440	
5	400	D	37.0–40.3	480	<b>HMCP400A5C</b>
		E	40.4–43.8	525	
		F	43.9–46.9	570	
		G	47.0–50.7	610	
		H	50.8–53.8	660	
		I	53.9–57.2	700	
5	400	A	38.5–43.4	500	<b>HMCP400D5C</b>
		B	43.5–48.0	565	
		C	48.1–53.0	626	
		D	53.1–57.6	690	
		E	57.7–62.3	750	
		F	62.4–67.3	810	
		G	67.4–71.9	875	
		H	72.0–76.9	935	
		I	77.0–81.6	1000	
5	400	A	48.1–53.8	625	<b>HMCP400F5C</b>
		B	53.9–59.9	700	
		C	60.0–66.1	780	
		D	66.2–72.3	860	
		E	72.4–78.4	940	
		F	78.5–83.8	1020	
		G	83.9–89.9	1090	
		H	90.0–96.1	1170	
		I	96.2–102.0	1250	
5	400	A	57.7–64.6	750	<b>HMCP400G5C</b>
		B	64.7–71.9	840	
		C	72.0–79.2	935	
		D	79.3–86.5	1030	
		E	86.6–93.8	1125	
		F	93.9–101.1	1220	
		G	101.2–108.4	1315	
		H	108.5–115.3	1410	
		I	115.4–122.4	1500	
5	400	A	67.4–75.3	875	<b>HMCP400J5C</b>
		B	75.4–83.8	980	
		C	83.9–92.3	1090	
		D	92.4–100.7	1200	
		E	100.8–109.2	1310	
		F	109.3–117.6	1420	
		G	117.7–126.1	1530	
		H	126.2–134.6	1640	
		I	134.7–142.8	1750	

#### 600 Vac Maximum, 250 Vdc Maximum, continued

NEMA Starter Size	Cont. Amps	Cam Setting	Motor Full Load Current Amperes (FLA) ①	MCP Trip Setting ②	MCP Catalog Number ③
5	400	A	77.0–86.5	1000	<b>HMCP400K5C</b>
		B	86.6–96.1	1125	
		C	96.2–105.7	1250	
		D	105.8–115.3	1375	
		E	115.4–124.9	1500	
		F	125.0–134.6	1625	
5	400	A	134.7–144.2	1750	<b>HMCP400L5C</b>
		B	144.3–153.8	1875	
		C	153.9–163.3	2000	
		D	163.4–172.9	2125	
		E	173.0–182.5	2250	
		F	182.6–192.1	2375	
		G	192.2–201.7	2500	
		H	201.8–211.3	2625	
		I	211.4–220.9	2750	
5	400	A	86.6–97.3	1125	<b>HMCP400M5C</b>
		B	97.4–108.4	1265	
		C	108.5–118.8	1410	
		D	118.9–129.9	1545	
		E	130.0–140.7	1690	
		F	140.8–151.5	1830	
		G	151.6–162.3	1970	
		H	162.4–173.0	2110	
		I	173.1–183.6	2250	
5	400	A	96.2–108.0	1250	<b>HMCP400N5C</b>
		B	108.1–119.9	1405	
		C	120.0–132.3	1560	
		D	132.4–144.2	1720	
		E	144.3–156.1	1875	
		F	156.2–168.0	2030	
		G	168.1–179.9	2185	
		H	180.0–192.3	2340	
		I	192.4–204.0	2500	
5	400	A	115.4–129.9	1500	<b>HMCP400O5C</b>
		B	130.0–144.2	1690	
		C	144.3–158.4	1875	
		D	158.5–173.0	2060	
		E	173.1–187.6	2250	
		F	187.7–201.9	2440	
		G	202.0–216.1	2625	
		H	216.2–230.7	2810	
		I	230.8–244.9	3000	

#### Notes

- ① Motor FLA ranges are typical. The corresponding trip setting is at 13 x the minimum FLA value shown. Where a 13 x setting is required for an intermediate FLA value, alternate cam settings and/or MCP ratings should be used.
  - ② For DC applications, actual trip levels are approximately 40% higher than values shown.
  - ③ Three-pole catalog numbers shown. Two-pole catalog numbers begin with **HM2P** in place of **HMCP**.
- All HMCP and HM2P 400A come with aluminum body terminals, 3TA400K. Catalog numbers with suffix "C" as shown above come with copper body terminals 3T400K.

600 Vac Maximum, 250 Vdc Maximum, continued

NEMA Starter Size	Cont. Amps	Cam Setting	Motor Full Load Current Amperes (FLA) ①	MCP Trip Setting ②	MCP Catalog Number ③
5	400	A	134.7–151.5	1750	<b>HMCP400R5C</b>
		B	151.6–168.4	1970	
		C	168.5–185.3	2190	
		D	185.4–201.9	2410	
		E	202.0–218.8	2625	
		F	218.9–235.7	2845	
		G	235.8–252.6	3065	
		H	252.7–269.2	3285	
		I	269.3–285.7	3500	
5	400	A	153.9–173.0	2000	<b>HMCP400X5C</b>
		B	173.1–192.3	2250	
		C	192.4–211.5	2500	
		D	211.6–230.7	2750	
		E	230.8–249.9	3000	
		F	250.0–269.2	3250	
		G	269.3–288.4	3500	
		H	288.5–307.6	3750	
		I	307.7–326.9	4000	
5	400	A	173.1–194.5	2250	<b>HMCP400Y5C</b>
		B	194.6–216.1	2530	
		C	216.2–237.6	2810	
		D	237.7–259.5	3090	
		E	259.6–281.1	3375	
		F	281.2–302.6	3655	
		G	302.7–324.1	3935	
		H	324.2–346.1	4215	
		I	346.2–368.1	4500	

L-Frame

600 Vac Maximum ④

NEMA Starter Size	Cont. Amps	Cam Setting	Motor Full Load Current Amperes (FLA) ①	MCP Trip Setting	MCP Catalog Number
6	600	A	138.5–184.5	1800	<b>HMCP600L6W</b>
		B	184.6–230.7	2400	
		C	230.8–276.8	3000	
		D	276.9–323.0	3600	
		E	323.1–369.1	4200	
		F	369.2–415.3	4800	
		G	415.4–461.4	5400	
		H	461.5–507.7	6000	
6	600	A	38.5–46.1	500	<b>HMCP600X6W</b>
		B	46.2–61.4	600	
		C	61.5–76.8	800	
		D	76.9–96.1	1000	
		E	96.2–115.3	1250	
		F	115.4–153.7	1500	
		G	153.8–192.2	2000	
		H	192.3–230.7	2500	
6	600	A	76.9–96.1	1000	<b>HMCP600Y6W</b>
		B	96.2–115.3	1250	
		C	115.4–153.7	1500	
		D	153.8–192.2	2000	
		E	192.3–230.7	2500	
		F	230.8–269.1	3000	
		G	269.2–307.6	3500	
		H	307.7–346.1	4000	

Notes

- ① Motor FLA ranges are typical. The corresponding trip setting is at 13 x the minimum FLA value shown. Where a 13 x setting is required for an intermediate FLA value, alternate cam settings and/or MCP ratings should be used.
- ② For DC applications, actual trip levels are approximately 40% higher than values shown.
- ③ Three-pole catalog numbers shown. Two-pole catalog numbers begin with **HM2P** in place of **HMCP**.
- ④ Equipped with electronic trip device.

All HMCP and HM2P 400A come with aluminum body terminals, 3TA400K. Catalog numbers with suffix "C" as shown above come with copper body terminals 3T400K.

All HMCP 600A come without terminals. For terminals, see **Page V4-T2-211**.

# 2.3

## Molded Case Circuit Breakers

### Series C

#### N-Frame

#### 600 Vac Maximum <sup>①</sup>

2

NEMA Starter Size	Cont. Amps	Cam Setting	Motor Full Load Current Amperes (FLA) <sup>②</sup>	MCP Trip Setting	MCP Catalog Number
7	800	A	123.1–184.5	1600	<b>HMCP800X7W</b>
		B	184.6–246.1	2400	
		C	246.2–307.6	3200	
		D	307.7–369.1	4000	
		E	369.2–430.7	4800	
		F	430.8–492.2	5600	
		G	492.3–553.7	6400	
8	1200	A	184.6–276.8	2400	<b>HMCP12Y8W</b>
		B	276.9–369.1	3600	
		C	369.2–461.4	4800	
		D	461.5–553.7	6000	
		E	553.8–646.1	7200	
		F	646.2–738.4	8400	
		G	738.5–830.7	9600	

#### Notes

- ① Equipped with electronic trip device.
- ② Motor FLA ranges are typical. The corresponding trip setting is at 13X the minimum FLA value shown. Where a 13X setting is required for an intermediate FLA value, alternate cam settings and/or MCP ratings should be used.

**Motor Protection Circuit Breakers**



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**Motor Protection Circuit Breakers (MPCB)**

**Product Description**

Motor protection circuit breakers (MPCBs) provide UL 489 branch circuit protection, UL 508 and CSA C22.2 No. 14 motor protection, and meet IEC 60947-2 and 50947-4 requirements. Typical branch motor loads are protected by three-component starters, consisting of breaker, contactor and overload relay, or fuse, contactor and overload relay. The MPCB application-specific protection eliminates the need for motor overload relay found in the traditional three-component starter assembly. The branch motor load protection is simplified to an MPCB and contactor, reducing both space requirements and heat generation in customer panels. Protection is provided by application-specific electronic trip units.

The electronic trip unit provides typical motor overload relay functionality and short-circuit protection against potential phase-to-phase or phase-to-ground faults.

- Disconnecting means
- Branch circuit short-circuit protection
- Overload protection
  - Class 5, 10, 15 and 20
- Phase unbalance protection
  - FDMP breaker trips when there is a 40% difference between any phase compared to the calculated three-phase average

- Phase loss protection
  - Active when the maximum phase current is greater than 50% of FLA setting
  - Breaker will trip when minimum phase current is 25% or less than the maximum phase current
  - Time delay of 1 or 2 seconds before breaker trips
- Thermal memory to prevent immediate restart after overload trip to allow motor to cool down

The MPCB is based on the Series C F-Frame. Accessories for standard Series C breakers apply to the MPCB. Unlike Motor Circuit Protectors (MCPs), MPCBs are UL 489 listed with 35 kA and 65 kA interruption ratings.

## Product Selection

## FDMP and HFDMP

Continuous Amperes	35 kA Without Phase Unbalance, Class 10 Motor Protection Only	35 kA With Phase Unbalance and Adjustable Motor Class Protection	65 kA Without Phase Unbalance, Class 10 Motor Protection Only	65 kA With Phase Unbalance and Adjustable Motor Class Protection
80	FDMP3080L	FDMP3080JL	HFDMP3080L	HFDMP3080JL
100	FDMP3100L	FDMP3100JL	HFDMP3100L	HFDMP3100JL
160	FDMP3160L	FDMP3160JL	HFDMP3160L	HFDMP3160JL
205	FDMP3205L	FDMP3205JL	HFDMP3205L	HFDMP3205JL

## FLA Ie Dial Setting

Continuous Amperes	A	B	C	D	E	F	G	H
80	40	50	60	70	80	—	—	—
100	80	—	90	—	100	—	—	—
160	100	115	130	145	160	—	—	—
205	160	170	180	195	205	—	—	—

## Technical Data and Specifications

## Specifications

Feature	FDMP	HFDMP
Interruption rating at 240V	65 kA	100 kA
Interruption rating at 480V	35 kA	65 kA
Interruption rating at 600V	18 kA	25 kA
Icu/Ics at 240V	65 kA/33 kA <sup>①</sup>	100 kA/50 kA <sup>①</sup>
Icu/Ics at 415V	35 kA/18 kA <sup>①</sup>	65 kA/33 kA <sup>①</sup>
100% rated	No	No
FLA range (A)	40–205	40–205
Motor class protection	5, 10, 15, 20	5, 10, 15, 20
Phase unbalance protection (current)—active for phase current >0.5 FLA setting	≥40% delta (single-phase); (three-phase avg.) for 5 seconds	≥40% delta (single-phase); (three-phase avg.) for 5 seconds
Phase loss protection (current)—active for phase current >0.5 FLA setting	Min. phase ≤0.25 max. phase for 1 second	Min. phase ≤0.25 max. phase for 1 second
Thermal memory protection	Yes	Yes
High load indicator	—	—
Pre-detection relays	—	—
Internal accessories	Factory installed Aux. alarm, shunt trip, UVR	Factory installed Aux. alarm, shunt trip, UVR

## Notes

<sup>①</sup> IEC ratings available only on FWMP and HFWMP.

For additional breaker solutions, see **Page V4-T2-84**.

**Type ELC Current Limiter Attachment**



**Type ELC Current Limiter Attachment (Size 0–4)**

**Product Description**

Eaton’s Type ELC current limiter attachment for the MCP is designed to provide increased interrupting capacity. The combination may be used for the application up to 200,000A symmetrical at 600 Vac, making the MCP suitable for use in network distribution systems or other applications where unusually high fault currents are available. The current limiter connects to the load end of the MCP and is provided with terminals suitable for copper or aluminum conductors. (See table at right.)

Limiters are coordinated with the MCP so that normal fault currents are interrupted automatically by the MCP without any damage to the limiter. Only the rare very high fault is opened by the limiter. Faults that are interrupted by the limiter also magnetically trip the MCP, opening all three poles, preventing single-phase operation.

Each of the three poles of the Type ELC limiter is equipped with an indicator that extends when a fault is interrupted by the limiter.

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**Product Selection**

**Type ELC Current Limiter Attachment**



**ELC Current Limiter Attachment**

MCP Rating (Amperes)	Catalog Number
3	ELC3003R
7	ELC3007R
15	ELC3015R
30	ELC3030R
50	ELC3050R
100	ELC3100R
150	ELC3150R

**Technical Data and Specifications**

**Type ELC Current Limiter Terminal Wire Sizes <sup>①</sup>**

Type ELC Current Limiter Maximum Amperes	Wire Range AWG	Metric (mm <sup>2</sup> )
<b>Standard Aluminum Terminals</b>		
50	14–2	2.5–35
100	1–4/0	50–95
150	1–4/0	50–95
<b>Non-Standard Terminals (Steel)</b>		
50	14–2 <sup>②</sup>	2.5–35
100	—	—
150	—	—

**Notes**

- ① Terminal wire connectors are UL listed for standard stranded wire sizes as defined in UL 486A or UL 486B.
  - ② Optional on special order for copper cable only.
- All HMCP 800A and 1200A come without terminals. For terminals, see **Page V4-T2-211**.

#### Current Limiting Circuit Breaker Module

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### Current Limiting Circuit Breaker Module

#### Product Overview

Power demand continues to grow in new and existing facilities. To meet increased demand, larger utility supplies, spot networks and large facility transformers are installed. The increased capacity of the electrical source results in increased fault currents in excess of 100 kA short-circuit protection. Eaton manufactures non-fused current limiting modules with interrupting capacities up to 200 kA at 600 Vac. Unlike fused current limiters with a one-time use, a current limiter module provides an automatic reset of the module after a short-circuit event. Resetting the molded-case circuit breaker is the only action required to restore critical power to the system; there is no time wasted with sourcing the correct replacement fuses or module to bring the system back online.

#### Product Description

The current limiting breaker modules use a unique contact design to enhance the system protection similar to that of the circuit breaker. When high short-circuit current is flowing through the contacts of these modules, the design results in very high interrupting capacities and improved current limiting characteristics.

#### Application Description

High-performance breakers are most commonly applied when very high fault levels are available and with applications where the current limiting capability is used upstream of the final load to limit current. Typical loads include lighting, power distribution, and motor control applications.

#### Features and Benefits

Superior system protection:

- Auto reset improves system uptime and eliminates the need for finding replacement parts
- No fuses to replace, reducing the overall cost of ownership and the waste created by fuses
- Overloads, by using inverse time current tripping characteristics of the molded-case circuit breaker
- Low-level short circuits, by using instantaneous and/or short-time delay tripping characteristics of the molded-case circuit breaker
- High-level short circuits, by using ultra-high-speed, blow-apart contacts of the current limiting module in series with the circuit breaker contacts
- Let-through currents, by improved opening speed of the contacts, the resultant rapid rise of arc voltage introduces impedance into the system

#### Standards and Certifications

- UL 489
- CSA C22.2



Product Selection

Series C High Performance Ratings

Type	Product	Amperes	480 Vac (UL)	600 Vac (UL)
FDC 3P thermal-magnetic	Breaker only	15–225	100	35
	With limiter	40–200	200	200

FD Frame



FD IC Rating—200 kAIC at 600 Vac ①

Amperes Rating	Breaker with Line Side Mounted Current Limiter ②	Breaker with Load Side Mounted Current Limiter ③
<b>Thermal-Magnetic</b>		
40	FDC3040Q01	FDC3040Q02
45	FDC3045Q01	FDC3045Q02
50	FDC3050Q01	FDC3050Q02
60	FDC3060Q01	FDC3060Q02
70	FDC3070Q01	FDC3070Q02
80	FDC3080Q01	FDC3080Q02
90	FDC3090Q01	FDC3090Q02
100	FDC3100Q01	FDC3100Q02
110	FDC3110Q01	FDC3110Q02
125	FDC3125Q01	FDC3125Q02
150	FDC3150Q01	FDC3150Q02
175	FDC3175Q01	FDC3175Q02
200	FDC3200Q01	FDC3200Q02

Notes

- ① Line and load terminal included.
- ② Two interphase barriers provided, mounted on line end of limiter, catalog number **FJ1PBK**.
- ③ Four interphase barriers provided, (2) line end of breaker, (2) load end of limiter.



# 2.3

## Molded Case Circuit Breakers

### Series C

2

#### Limiter Terminals

Maximum Breaker Amperes	Terminal Body Material	Wire Type	Metric Wire Range mm <sup>2</sup>	AWG Wire Range/ Number of Conductors	Catalog Number
<b>Standard Pressure Type Terminals</b>					
250	Aluminum	Cu/Al	10–185	#8–350 (1)	TA250FJ <sup>Ⓞ</sup>

#### Breaker Load Terminals (For Line Mounted Limiters Only)

Maximum Breaker Amperes	Terminal Body Material	Wire Type	AWG Wire Range	Metric Wire Range mm <sup>2</sup>	Package of Three Terminals Catalog Number
<b>Standard Pressure Type Terminals</b>					
100	Steel	Cu/Al	14–1/0	2.5–50	3T100FB
225	Aluminum	Cu/Al	4–4/0	25–95	3TA225FD

**Note**

<sup>Ⓞ</sup> Load side breaker terminations included for units configured with line mounted limiters.

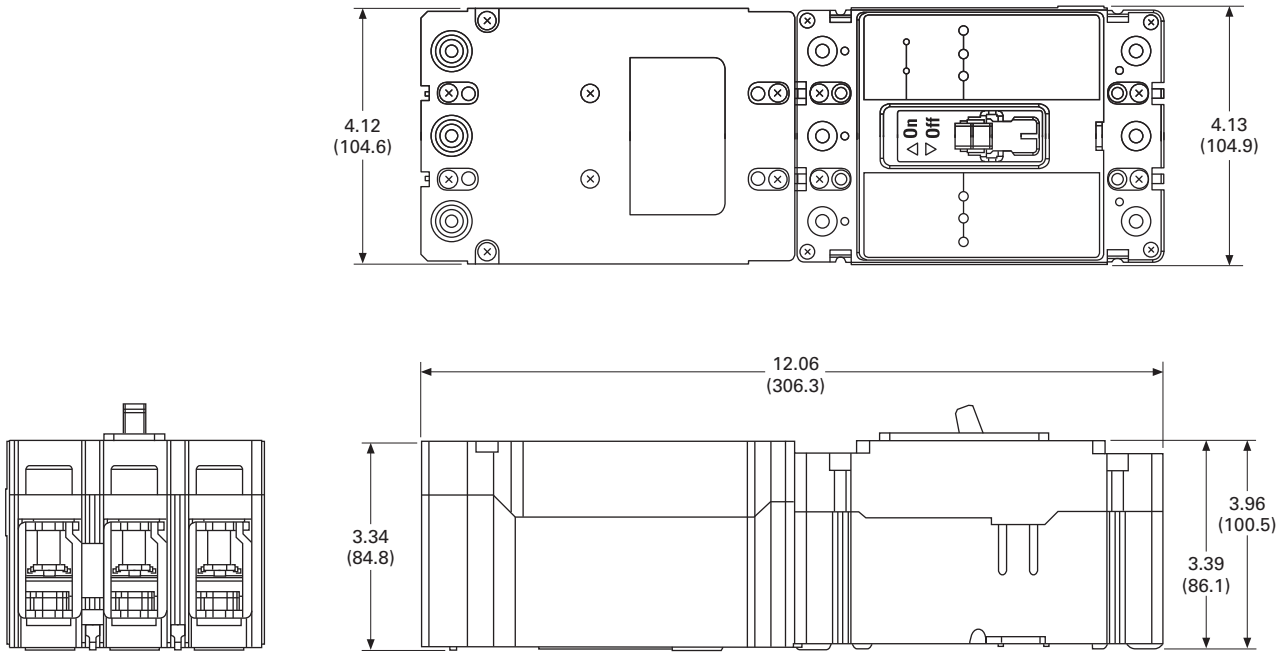
## Dimensions and Weights

Approximate Dimensions in Inches (mm)

### Assembled Breaker and Current Limiting Module

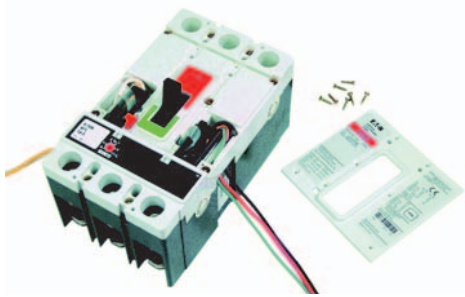
Frame	Height	Width	Depth	Weight in lbs (kg)
FD + limiter	12.06 (306.3)	4.13 (104.9)	3.39 (86.1)	8.50 (3.86)

### FD-Frame With Current Limiter Module



#### Series C Internal Accessories

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### Internal Accessories

#### Product Overview

##### Alarm Switch

For remote indication of automatic trip operation. Does not function with manual switching; however, it will operate when either a shunt trip or undervoltage release is operated. A “make” contact closes and a “break” contact opens when the alarm/lockout switch operates. The switch automatically resets when the circuit breaker is reset.

##### Auxiliary Switch

The auxiliary switch provides circuit breaker contact status information by monitoring the position of the molded cross bar that contains the moving contact arms. The auxiliary switch is used for remote indication and interlock system verification, and consists of one or two SPDT switches housed in a plug-in module. Each SPDT switch has one “a” and one “b” contact. When the circuit breaker contacts are open, the “a” contact is open and the “b” contact is closed.

##### Auxiliary Switch and Alarm Switch Combination

Each catalog number listed in tables on **Pages V4-T2-273** and **V4-T2-274** includes one auxiliary switch and one alarm switch. In an auxiliary switch ASL switch combination, the auxiliary switch is always mounted on the side of the plug-in module next to the center pole of the circuit breaker.

##### Shunt Trip

The shunt trip provides remote controlled tripping of the circuit breaker. The shunt trip consists of an intermittent rated solenoid with a tripping plunger and a cutoff switch assembled to a plug-in module. When required for ground fault protection applications, certain AC rated shunt trips, as noted in the electrical rating table, are suitable for operation at 55 percent of rated voltage.

Select shunt trip catalog number for the voltage within the indicated voltage range. Shunt trip coils are designed to be applied at specific AC or DC voltages within the voltage range shown. Electrical ratings are also shown on applicable circuit breaker accessory nameplates.

##### Low Energy Shunt Trip

Low energy shunt trip devices are designed to operate from low energy output signals from dedicated current sensors typically applied in ground fault protection schemes. However, with a proper control voltage source, they may be applied in place of conventional trip devices for special applications. Flux paths surrounding permanent magnets used in the shunt trip assembly hold a charged spring poised in readiness to operate the circuit breaker trip mechanism.

When a 100 microfarad capacitor charged to 28 Vdc is discharged through the shunt trip coil, the resultant flux opposes the permanent magnet flux field, which releases the stored energy in the spring to trip the circuit breaker. As the circuit breaker resets, the shunt trip reset arm is actuated by the circuit breaker handle, resetting the shunt trip. The plug-in module is mounted in retaining slots in the top of the trip unit. Coil is intermittent-rated only. Cutoff provisions required in control circuit.

**Undervoltage Release Mechanism**

The undervoltage release mechanism monitors a voltage (typically a line voltage) and trips the circuit breaker when the voltage falls to between 70 and 35 percent of the solenoid coil rating.

The undervoltage release mechanism consists of a continuous rated solenoid with a plunger and tripping lever mounted in a plug-in module. The tab on the tripping lever resets the undervoltage release mechanism when normal voltage has been restored and the circuit breaker handle is moved to the reset (or OFF) position. With less than pickup voltage applied to the undervoltage release mechanism, the circuit breaker contacts will not touch when a closing operation is attempted.

**Note:** Undervoltage release mechanism accessories are not designed for, and should not be used as, circuit interlocks.

**Accessory Terminal Block (R-Frame)**

(For fixed-mounted configuration.)

Internal accessory wiring leads are normally supplied with pigtail leads (18 AWG) that exit from the right side of the circuit breaker. Where specified, fixed-mounted accessory terminal blocks are available. A maximum of one 24-point terminal block can be installed on the right side of the circuit breaker for the internal accessories.

For convenience in determining the appropriate number of terminal block points required, refer to **Page V4-T2-269**.

**PowerNet and Zone Interlock Kits (OPTIM 550 only) K-, L- and N-Frames**

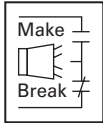
Eaton's PowerNet Communications Kit can be ordered to add PowerNet communications to an existing OPTIM 550 breaker in the field. An 18-inch (457.2 mm) wiring pigtail is routed to the rear of the breaker: two wires for PowerNet and two wires for 24 Vdc (45 mA load). It is recommended that the power supply be an "isolated high quality" unit.

#### Product Selection

#### Alarm Switch

2

#### Alarm Switch



#### G-Frame Alarm Switch (RH Only) ①

Electrical Ratings			Contact Arrangement	Factory Suffix	Catalog Number ②③④
Volts	Frequency	Amperes			
<b>Alarm Switch</b>					
240	50/60 Hz	6	1 Make/1 Break	B3	1288C75G03
<b>Alarm Switch Auxiliary Switches Combination</b>					
240	50/60 Hz	6	1 Make/1 Break and 1A/1B	B13	1288C76G09

#### F-Frame Alarm Switch ①

Number of Contacts (Make and Break)	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Factory Installation Kit ⑤		
		Same Side	Rear ⑦	Opposite Side	Terminal Block Same Side	Pigtail Leads	Terminal Block
		Suffix Number	Suffix Number	Suffix Number	Suffix Number	Catalog Number	Catalog Number
1	Left ⑦	B01	B02	B03	B04	A1L1LPK	A1L1LTK
	Right	B05	B06	B07	B08	A1L1RPK	A1L1RTK
2	Left ⑦	B09	B10	—	B11	A2L1LPK	A2L1LTK
	Right	B12	B13	—	B14	A2L1RPK	A2L1RTK
1 (Make only)	Single-pole	B15 ⑧	—	—	—	—	—

#### F-Frame HMCP Alarm Switch ①

Number of Contacts (Make and Break)	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Factory Installation Kit ⑤		
		Same Side	Rear ⑦	Opposite Side	Terminal Block Same Side	Pigtail Leads	Terminal Block
		Suffix Number	Suffix Number	Suffix Number	Suffix Number	Catalog Number	Catalog Number
1	Left ⑦	B01	B02	B03	B04	MA1L1LPK	MA1L1LTK
	Right	B05	B06	B07	B08	MA1L1RPK	MA1L1RTK
2	Left ⑦	B09	B10	—	B11	MA2L1LPK	MA2L1LTK
	Right	B12	B13	—	B14	MA2L1RPK	MA2L1RTK

#### J-Frame and HMCP (J) Alarm Switch

Number of Contacts (Make and Break)	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Field Mounted Field Installation Kits ⑤		
		Same Side	Rear ⑦	Opposite Side	Terminal Block Same Side	Pigtail Leads	Terminal Block
		Suffix Number	Suffix Number	Suffix Number	Suffix Number	Catalog Number	Catalog Number
1	Left ⑧	B01	B02	B03	B04	A1L2LPK	A1L2LTK
	Right	B05	B06	B07	B08	A1L2RPK	A1L2RTK ⑥

#### Notes

- ① F-Frame circuit breakers are factory sealed. Underwriters Laboratories requires that internal accessories be installed at the factory. Internal accessories are UL listed for factory installation under E7819. Where local codes and standards permit and UL listing is not required, internal accessories can be field installed. Accessory installation should be done before the circuit breaker is mounted and connected.
- ② Includes 24-inch (609.6 mm) external pigtail leads, 18 AWG (16–0.010).
- ③ A maximum of two internal accessories may be mounted in a three-pole circuit breaker.
- ④ Suitable for mounting in right pole only of two- or three-pole breaker.
- ⑤ Not listed with Underwriters Laboratories; for field installation.
- ⑥ Standard pigtail lead exit location.
- ⑦ Standard mounting location.
- ⑧ Factory installation only. Leads exit load end of circuit breaker.
- ⑨ Listed with Underwriters Laboratories; for field installation on interchangeable trip unit breakers under E64983.
- ⑩ Standard mounting location—leads exit rear of breaker.

## K-Frame and HMCP (K) Alarm Switch

Number of Sets of Contacts (1M and 1B)	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Terminal Block Same Side Suffix Number	Field Mounted Field Installation Kits <sup>①</sup>	
		Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number		Pigtail Leads Catalog Number	Terminal Block Catalog Number
		1	Left <sup>③</sup>	B01		B02	B03
	Right <sup>④</sup>	B05	B06	B07	B08	A1L3RPK	A1L3RTK
2	Left <sup>③</sup>	B09	B10	—	B11	A2L3LPK	A2L3LTK
	Right <sup>④</sup>	B12	B13	—	B14	A2L3RPK	A2L3RTK

## L-, HMCP (L) and (M) Frames and Alarm Switch

Number of Sets of Contacts (1M and 1B)	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Terminal Block Same Side Suffix Number	Field Mounted Field Installation Kits <sup>①</sup>	
		Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number		Pigtail Leads Catalog Number	Terminal Block Catalog Number
		1	Left <sup>③</sup>	B01		B02	B03
	Right	B05	B06	B07	B08	A1L4RPK	A1L4RTK
2	Left <sup>③</sup>	B09	B10	—	B11	A2L4LPK	A2L4LTK
	Right	B12	B13	—	B14	A2L4RPK	A2L4RTK

## N-Frame and HMCP (N) Alarm Switch

Number of Sets of Contacts (1M and 1B)	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Terminal Block Same Side Suffix Number	Field Mounted Field Installation Kits <sup>①</sup>	
		Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number		Pigtail Leads Catalog Number	Terminal Block Catalog Number
		1	Left	B01		B02	B03
	Right <sup>③</sup>	B05	B06	B07	B08	A1L5RPK	A1L5RTK
2	Left	B09	B10	—	B11	A2L5LPK	A2L5LTK
	Right <sup>③</sup>	B12	B13	—	B14	A2L5RPK	A2L5RTK

## R-Frame Alarm Switch (RH Only)

Number of Contacts (Make and Break)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads	Field Mounted Field Installation Kits <sup>⑤</sup>
	Suffix Number <sup>⑥</sup>	Pigtail Leads Catalog Number <sup>⑥</sup>
1	B05	A1L6RPK
2	B12	A2L6RPK

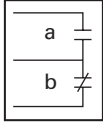
## Notes

- ① Listed with Underwriters Laboratories; for field installation on interchangeable trip unit breakers under E64983.
- ② Standard mounting location.
- ③ Standard mounting location—leads exit rear of breaker.
- ④ Breakers with K-Frame OPTIM 550 can only accept accessories in left pole.
- ⑤ Listed with Underwriters Laboratories for field installation under E64983.
- ⑥ A maximum of three ASL plug-in modules may be installed in a circuit breaker.

#### Auxiliary Switch

2

#### Auxiliary Switch



#### G-Frame Auxiliary Switch (RH Only)

Electrical Ratings			Contact Arrangement	Factory Suffix	Catalog Number <sup>①②</sup>
Volts	Frequency	Amperes			
240	50/60 Hz	6	1a/1b	A3	1288C74G03
240	50/60 Hz	6	2a/2b	A6	1288C73G03

#### F-Frame and HMCP (F) Auxiliary Switch

Number of Contacts A and B	Mounting Location (Pole)	Factory Mounted Connection Type and Location				Factory Installation Kit <sup>④</sup>	
		18-Inch (457.2 mm) Pigtail Leads				Terminal Block	Terminal Block
		Same Side Suffix Number	Rear <sup>③</sup> Suffix Number	Opposite Side Suffix Number	Same Side Suffix Number	Pigtail Leads Catalog Number	Terminal Block Catalog Number
1	Left <sup>⑤</sup>	A01	A02	A03	A04	A1X1PK	A1X1LTK
	Left <sup>⑤</sup>	A15 <sup>⑦</sup>	A16 <sup>⑦</sup>	A17 <sup>⑦</sup>	—	E1X1PK	—
	Right or Neutral <sup>⑥</sup>	A05	A06	A07	A08	A1X1PK	A1X1RTK <sup>⑧</sup>
	Right or Neutral <sup>⑥</sup>	A18 <sup>⑦</sup>	A19 <sup>⑦</sup>	A20 <sup>⑦</sup>	—	—	—
2	Left <sup>⑤</sup>	A09	A10	—	A11	A2X1LPK	A2X1LTK
	Left <sup>⑤</sup>	A21 <sup>⑦</sup>	A22 <sup>⑦</sup>	—	—	E2X1LPK	—
	Right or Neutral <sup>⑥</sup>	A12	A13	—	A14	A2X1RPK	A2X1RTK <sup>⑧</sup>
	Right or Neutral <sup>⑥</sup>	A23 <sup>⑦</sup>	A24 <sup>⑦</sup>	—	—	E2X1RPK	—

#### F-Frame with Electronic Trip Unit Auxiliary Switch <sup>⑨</sup>

Number of Contacts A and B	Mounting Location (Pole)	Factory Mounted Connection Type and Location			Factory Installation Kit <sup>④</sup>		
		18-Inch (457.2 mm) Pigtail Leads			Terminal Block	Pigtail Leads	Terminal Block
		Same Side Suffix Number	Rear Suffix Number	Opposite Side Suffix Number	Same Side Suffix Number	Catalog Number	Catalog Number
1	Right	A30	A31	A32	—	A1X1RPKFDE	—

#### J-Frame and HMCP (J) Auxiliary Switch

Number of Contacts A and B	Mounting Location (Pole)	Factory Mounted Connection Type and Location				Field Mounted Factory Installation Kit <sup>⑩</sup>	
		18-Inch (457.2 mm) Pigtail Leads				Terminal Block	Terminal Block
		Same Side Suffix Number	Rear <sup>③</sup> Suffix Number	Opposite Side Suffix Number	Same Side Suffix Number	Pigtail Leads Catalog Number	Terminal Block Catalog Number
1	Left	A01	A02	A03	A04	A1X2PK	A1X2LTK
	Right <sup>⑧</sup>	A05	A06	A07	A08	A1X2PK	A1X2RTK <sup>⑧</sup>
2	Left	A09	A10	—	A11	A2X2PK	A2X2LTK
	Right <sup>⑧</sup>	A12	A13	—	A14	A2X2PK	A2X2RTK <sup>⑧</sup>

#### Notes

- ① Includes 24-inch external pigtail leads, 18 AWG (16–0.010).
- ② A maximum of two internal accessories may be mounted in a three-pole circuit breaker. Suitable for mounting in right pole only of two- or three-pole breaker.
- ③ Standard pigtail lead exit location.
- ④ Not listed with Underwriters Laboratories; for field installation.
- ⑤ Pigtail wire size: 18 AWG (0.82 mm<sup>2</sup>).
- ⑥ Not for use on F-Frame with electronic trip unit.
- ⑦ 125 volts (max.), 50/60 Hz switch for use in electronic circuit of 100 micro amperes and 15 Vdc minimum.
- ⑧ Not for use on four-pole circuit breakers.
- ⑨ Only for use on three-pole F-Frame breakers with electronic trip unit.
- ⑩ Listed with Underwriters Laboratories for field installation or interchangeable trip unit breakers under E64983.
- ⑪ Standard mounting location—leads exit rear of breaker.

## K-Frame and HMCP (K) Auxiliary Switch

Number of Contacts A and B	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Terminal Block Same Side Suffix Number	Field Mounted Factory Installation Kit <sup>①</sup>	
		Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number		Pigtail Leads	Terminal Block
		Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number		Catalog Number	Catalog Number
1	Left	A01	A02	A03	A04	A1X3PK	A1X3LTK
	Right <sup>②③</sup>	A05	A06	A07	A08	A1X3PK	A1X3RTK <sup>④</sup>
2	Left	A09	A10	—	A11	A2X3PK	A2X3LTK
	Right <sup>②③</sup>	A12	A13	—	A14	A2X3PK	A2X3RTK <sup>④</sup>
	Right	A21	A22	—	—	1482D28G10 <sup>⑥⑦</sup>	—
3	Left	A18	—	—	A15	A3X3LPK	A3X3LTK
	Right <sup>③</sup>	A17	—	—	A16	A3X3RPK	A3X3RTK <sup>④</sup>

## L-, HMCP (L) and (M) Frames and Auxiliary Switch

Number of Contacts A and B	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Terminal Block Same Side Suffix Number	Field Mounted Factory Installation Kit <sup>①</sup>	
		Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number		Pigtail Leads	Terminal Block
		Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number		Catalog Number	Catalog Number
1	Left	A01	A02	A03	A04	A1X4PK	A1X4LTK
	Right <sup>②</sup>	A05	A06	A07	A08	A1X4PK	A1X4RTK <sup>④</sup>
2	Left	A09	A10	—	A11	A2X4PK	A2X4LTK
	Right <sup>②</sup>	A12	A13	—	A14	A2X4PK	A2X4RTK <sup>④</sup>
3	Left	A18	—	—	A15	A3X4PK	A3X4LTK
	Right <sup>②</sup>	A17	—	—	A16	A3X4PK	A3X4RTK <sup>④</sup>

## N-Frame and HMCP (N) Auxiliary Switch

Number of Contacts A and B	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Terminal Block Same Side Suffix Number	Field Mounted Factory Installation Kit <sup>①</sup>	
		Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number		Pigtail Leads	Terminal Block
		Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number		Catalog Number	Catalog Number
1	Left	A01	A02	A03	A04	A1X5PK	A1X5LTK
	Right <sup>②</sup>	A05	A06	A07	A08	A1X5PK	A1X5RTK <sup>④</sup>
2	Left	A09	A10	—	A11	A2X5PK	A2X5LTK
	Right <sup>②</sup>	A12	A13	—	A14	A2X5PK	A2X5RTK <sup>④</sup>
3	Left	A18	—	—	A15	A3X5LPK	A3X5LTK
	Right <sup>②</sup>	A17	—	—	A16	A3X5RPK	A3X5RTK <sup>④</sup>

## R-Frame Auxiliary Switch (RH Only)

Number of Contacts A and B	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads	Field Mounted Field Installation Kits <sup>①</sup>
	Suffix Number <sup>⑤</sup>	Pigtail Leads Catalog Number <sup>⑤</sup>
2	A12	A2X6RPK
4	A19	A4X6RPK

## Notes

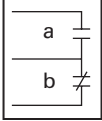
- <sup>①</sup> Listed with Underwriters Laboratories for field installation under E64983.  
<sup>②</sup> Standard mounting location—leads exit rear of breaker.  
<sup>③</sup> Breakers with K-Frame OPTIM 550 can only accept accessories in left pole.  
<sup>④</sup> Not for use on four-pole circuit breakers.  
<sup>⑤</sup> A maximum of two auxiliary switches (any combination of 2a/2b or 4a/4b plug-in modules may be installed in a circuit breaker).  
<sup>⑥</sup> This option is not field installable.  
<sup>⑦</sup> Available on the OPTIM 550 only. Communications are not available with this option.



#### Auxiliary Switch and Alarm Switch Combination

2

Auxiliary Switch and Alarm Switch Combination



#### F-Frame Auxiliary Switch and Alarm Switch Combination

Mounting Location (Pole)	Factory Mounted Connection Type and Location			Factory Installation Kit <sup>①</sup>	
	18-Inch (457 mm) Pigtail Leads			Terminal Block	Pigtail Leads
	Same Side	Rear <sup>②</sup>	Terminal Block	Same Side	Terminal Block
	Suffix Number	Suffix Number	Suffix Number	Catalog Number	Catalog Number
Left <sup>②</sup>	C01	C02	C03	AAL1LPK	AAL1LTK
Right	C04	C05	C06	AAL1RPK	AAL1RTK <sup>③</sup>

#### F-Frame HMCP Auxiliary Switch and Alarm Switch Combination

Mounting Location (Pole)	Factory Mounted Connection Type and Location			Factory Installation Kit <sup>①</sup>	
	18-Inch (457 mm) Pigtail Leads			Terminal Block	Pigtail Leads
	Same Side	Rear <sup>②</sup>	Terminal Block	Same Side	Terminal Block
	Suffix Number	Suffix Number	Suffix Number	Catalog Number	Catalog Number
Left <sup>③</sup>	C01	C02	C03	MAAL1LPK	MAAL1LTK
Right	C04	C05	C06	MAAL1RPK	MAAL1RPK

#### J-Frame and HMCP (J) Auxiliary Switch and Alarm Switch Combination

Number of Sets of Contacts (1A and 1B) (1M–1B)	Mounting Location (Pole)	Factory Mounted Connection Type and Location			Field Mounted Field Installation Kits <sup>④</sup>		
		18-Inch (457 mm) Pigtail Leads			Terminal Block	Pigtail Leads	Terminal Block
		Same Side	Rear <sup>⑤</sup>	Opposite Side	Same Side	Terminal Block	Pigtail Leads
		Suffix Number	Suffix Number	Suffix Number	Suffix Number	Catalog Number	Catalog Number
1	Left	C01	C02	—	C03	AAL2LPK	AAL2LTK
	Right <sup>⑥</sup>	C04	C05	—	C06	AAL2RPK	AAL2RTK <sup>③</sup>

#### K-Frame and HMCP (K) Auxiliary Switch and Alarm Switch Combination

Number of Sets of Contacts (1A and 1B) (1M–1B)	Mounting Location (Pole)	Factory Mounted Connection Type and Location			Field Mounted Field Installation Kits <sup>④</sup>		
		18-Inch (457 mm) Pigtail Leads			Terminal Block	Pigtail Leads	Terminal Block
		Same Side	Rear <sup>⑤</sup>	Opposite Side	Same Side	Terminal Block	Pigtail Leads
		Suffix Number	Suffix Number	Suffix Number	Suffix Number	Catalog Number	Catalog Number
1	Left	C01	C02	—	C03	AAL3LPK	AAL3LTK
	Right <sup>⑥⑥</sup>	C04	C05	—	C06	AAL3RPK <sup>⑦</sup>	AAL3RTK
	Right	C07	C08	—	—	1482D28G09 <sup>⑧⑨</sup>	—

#### Notes

- ① Not listed with Underwriters Laboratories for field installation.
- ② Standard mounting location.
- ③ Not for use on four-pole circuit breakers
- ④ Listed with Underwriters Laboratories for field installation of interchangeable trip unit breakers under E64983.
- ⑤ Standard mounting location—leads exit rear of breaker.
- ⑥ Breakers with K-Frame OPTIM 550 can only accept accessories in left pole.
- ⑦ Will not install on OPTIM Trip (RH).
- ⑧ Available on the OPTIM 550 only. Communications are not available with this option.
- ⑨ This option is not field installable.

## L-, HMCP (L) and (M) Frames and Auxiliary Switch and Alarm Switch Combination

Number of Sets of Contacts	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457 mm) Pigtail Leads			Terminal Block Same Side Suffix Number	Field Mounted Field Installation Kits <sup>①</sup>	
		Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number		Pigtail Leads Catalog Number	Terminal Block Catalog Number
		C01	C02	—		C03	AA114LPK
1A, 1B and 1 Make/1 Break	Left	C01	C02	—	C03	AA114LPK	AA114LTK
	Right <sup>②</sup>	C04	C05	—	C06	AA114RPK	AA114RTK <sup>③</sup>
2A, 2B and 1 Make/1 Break	Left	C07	C08	—	C12	AA214LPK	AA214LTK
	Right <sup>②</sup>	C10	C11	—	C13	AA214RPK	AA214RTK <sup>③</sup>
3A, 3B and 1 Make/1 Break	Left	C14	—	—	—	AA314LPK	—
	Right <sup>②</sup>	C15	—	—	—	AA314RPK	—

## N-Frame and HMCP (N) Auxiliary Switch and Alarm Switch Combination

Number of Sets of Contacts	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457 mm) Pigtail Leads			Terminal Block Same Side Suffix Number	Field Mounted Field Installation Kits <sup>①</sup>	
		Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number		Pigtail Leads Catalog Number	Terminal Block Catalog Number
		C01	C02	—		C03	AA115LPK
1A, 1B and 1 Make/1 Break	Left	C01	C02	—	C03	AA115LPK	AA115LTK
	Right <sup>②</sup>	C04	C05	—	C06	AA115RPK	AA115RTK <sup>③</sup>
2A, 2B and 1 Make/1 Break	Left	C07	C08	—	C12	AA215LPK	AA215LTK
	Right <sup>②</sup>	C10	C11	—	C13	AA215RPK	AA215RTK <sup>③</sup>

**Notes**

<sup>①</sup> Listed with Underwriters Laboratories for field installation under E64983.

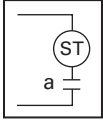
<sup>②</sup> Standard mounting location—leads exit rear of breaker.

<sup>③</sup> Not for use on four-pole circuit breaker.

## Shunt Trip

2

## Shunt Trip



## G-Frame Shunt Trip (LH Three-Pole Only)

Electrical Ratings			Suffix Number	Catalog Number
Volts	Frequency	Amperes		
120	50/60 Hz	1.1	<b>S1</b>	<b>1373D62G01</b>
240	50/60 Hz	2.1	<b>S2</b>	<b>1373D62G02</b>
12	DC	2.8	<b>S3</b>	<b>1373D62G15</b>
24	DC	5.7	<b>S4</b>	<b>1373D62G16</b>
24	60 Hz	—	<b>S7</b>	<b>1373D62G20</b>

## F-Frame and HMCP (F) Shunt Trip

Voltage Rating (AC Frequency = 50/60 Hz)	Factory Mounted Connection Type and Location			Factory Installation Kit <sup>①</sup>		
	18-Inch (457.2 mm) Pigtail Leads <sup>②</sup>			Terminal Block	Pigtail Leads	Terminal Block
	Same Side	Rear <sup>③</sup>	Opposite Side	Same Side		
	Suffix Number	Suffix Number	Suffix Number	Suffix Number	Catalog Number	Catalog Number
<b>Left-Pole Mounting AC/DC Ratings</b>						
12–24 Vac or Vdc	<b>S01</b>	<b>S02</b>	<b>S03</b>	<b>S04</b>	<b>SNT1LP03K</b>	<b>SNT1LT03K</b>
48–127 Vac or 48–60 Vdc <sup>④</sup>	<b>S05</b>	<b>S06</b>	<b>S07</b>	<b>S08</b>	<b>SNT1LP08K</b>	<b>SNT1LT08K</b>
208–380 Vac or 110–127 Vdc	<b>S09</b>	<b>S10</b>	<b>S11</b>	<b>S12</b>	<b>SNT1LP12K</b>	<b>SNT1LT12K</b>
415–600 Vac or 220–250 Vdc	<b>S13</b>	<b>S14</b>	<b>S15</b>	<b>S16</b>	<b>SNT1LP18K</b>	<b>SNT1LT18K</b>
<b>Right- or Neutral-Pole Mounting AC/DC Ratings <sup>⑤</sup></b>						
12–24 Vac or Vdc	<b>S17</b>	<b>S18</b>	<b>S19</b>	<b>S20</b>	<b>SNT1RP03K</b>	<b>SNT1RT03K <sup>⑥</sup></b>
48–127 Vac or 48–60 Vdc <sup>④</sup>	<b>S21</b>	<b>S22</b>	<b>S23</b>	<b>S24</b>	<b>SNT1RP08K</b>	<b>SNT1RT08K <sup>⑥</sup></b>
208–380 Vac or 110–127 Vdc	<b>S25</b>	<b>S26</b>	<b>S27</b>	<b>S28</b>	<b>SNT1RP12K</b>	<b>SNT1RT12K <sup>⑥</sup></b>
415–600 Vac or 220–250 Vdc	<b>S29</b>	<b>S30</b>	<b>S31</b>	<b>S32</b>	<b>SNT1RP18K</b>	<b>SNT1RT18K <sup>⑥</sup></b>

## Notes

<sup>①</sup> Not listed with Underwriters Laboratories, for field installation.

<sup>②</sup> Pigtail wire size: 18 AWG (0.82 mm<sup>2</sup>).

<sup>③</sup> Standard pigtail lead exit location.

<sup>④</sup> 120 Vac marked suitable for ground fault protection devices.

<sup>⑤</sup> Standard mounting location.

<sup>⑥</sup> Not for use on four-pole circuit breakers.

G-Frame circuit breakers are factory sealed. Underwriters Laboratories requires that internal accessories be installed at the factory.

Internal accessories are UL listed for factory installation under E7819.

Where local codes and standards permit and UL listing is not required, internal accessories can be field installed. Accessory installation should be done before the circuit breaker is mounted and connected.

## J-Frame and HMCP (J) Shunt Trip

Voltage Rating (AC Frequency = 50/60 Hz)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Terminal Block Same Side Suffix Number	Field Mounted Field Installation Kits <sup>①</sup>	
	Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number		Pigtail Leads	Terminal Block
					Catalog Number	Catalog Number
<b>Left-Pole Mounting AC/DC Ratings<sup>②</sup></b>						
12–24 Vac or Vdc	S41	S42	S43	S44	SNT2P04K	SNT2T04K
48–60 Vac or Vdc	S49	S50	S51	S52	SNT2P06K	SNT2T06K
110–240 Vac or 110–125 Vdc <sup>③</sup>	S09	S10	S11	S12	SNT2P11K	SNT2T11K
380–440 Vac or 220–250 Vdc	S13	S14	S15	S16	SNT2P14K	SNT2T14K
480–600 Vac	S17	S18	S19	S20	SNT2P18K	SNT2T18K
<b>Right- or Neutral-Pole Mounting AC/DC Ratings</b>						
12–24 Vac or Vdc	S45	S46	S47	S48	SNT2P04K	SNT2T04K <sup>④</sup>
48–60 Vac or Vdc	S53	S54	S55	S56	SNT2P06K	SNT2T06K <sup>④</sup>
110–240 Vac or 110–125 Vdc <sup>③</sup>	S29	S30	S31	S32	SNT2P11K	SNT2T11K <sup>④</sup>
380–440 Vac or 220–250 Vdc	S33	S34	S35	S36	SNT2P14K	SNT2T14K <sup>④</sup>
480–600 Vac	S37	S38	S39	S40	SNT2P18K	SNT2T18K <sup>④</sup>

## K-Frame and HMCP (K) Shunt Trip

Voltage Rating (AC Frequency = 50/60 Hz)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Terminal Block Same Side Suffix Number	Field Mounted Field Installation Kits <sup>①</sup>	
	Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number		Pigtail Leads	Terminal Block
					Catalog Number	Catalog Number
<b>Left-Pole Mounting AC/DC Ratings<sup>②</sup></b>						
12–24 Vac or Vdc	S41	S42	S43	S44	SNT3P04K	SNT3T04K
48–60 Vac or Vdc	S49	S50	S51	S52	SNT3P06K	SNT3T06K
110–240 Vac or 110–125 Vdc <sup>③</sup>	S09	S10	S11	S12	SNT3P11K	SNT3T11K
380–440 Vac or 220–250 Vdc	S13	S14	S15	S16	SNT3P14K	SNT3T14K
480–600 Vac	S17	S18	S19	S20	SNT3P18K	SNT3T18K
<b>Right- or Neutral-Pole Mounting AC/DC Ratings<sup>⑤⑥</sup></b>						
12–24 Vac or Vdc	S45	S46	S47	S48	SNT3P04K	SNT3T04K <sup>④</sup>
48–60 Vac or Vdc	S53	S54	S55	S56	SNT3P06K	SNT3T06K <sup>④</sup>
110–240 Vac or 110–125 Vdc <sup>③</sup>	S29	S30	S31	S32	SNT3P11K	SNT3T11K <sup>④</sup>
380–440 Vac or 220–250 Vdc	S33	S34	S35	S36	SNT3P14K	SNT3T14K <sup>④</sup>
480–600 Vac	S37	S38	S39	S40	SNT3P18K	SNT3T18K <sup>④</sup>

## Notes

- ① Listed with Underwriters Laboratories for field installation under E64983.
- ② Standard mounting location—leads exit rear of breaker.
- ③ Suitable for use with Class 1 ground fault sensing element.
- ④ Not for use on four-pole circuit breakers.
- ⑤ For use with KT (thermal-magnetic) trip units only.
- ⑥ Breakers with K-Frame OPTIM 550 can only accept accessories in left pole.

# 2.3

## Molded Case Circuit Breakers

### Series C

2

#### L-, HMCP (L) and (M) Frames and Shunt Trip

Voltage Rating (AC Frequency = 50/60 Hz)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Terminal Block Same Side Suffix Number	Field Mounted Field Installation Kits <sup>①</sup>	
	Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number		Pigtail Leads Catalog Number	Terminal Block Catalog Number
<b>Left-Pole Mounting AC/DC Ratings <sup>②</sup></b>						
12–24 Vac or Vdc	S01	S02	S03	S04	SNT4LP03K	SNT4LT03K
48–60 Vac	S05	S06	S07	S08	SNT4LP05K	SNT4LT05K
48–60 Vdc	S85	S86	S87	—	SNT4LP23K	SNT4LT23K
110–240 Vac	S09	S10	S11	S12	SNT4LP11K	SNT4LT11K
110–125 Vdc	S41	S42	S43	S44	SNT4LP26K	SNT4LT26K
380–440 Vac or 220–250 Vdc	S13	S14	S15	S16	SNT4LP14K	SNT4LT14K
480–600 Vac	S17	S18	S19	S20	SNT4LP18K	SNT4LT18K
<b>Right-Pole Mounting AC/DC Ratings <sup>③</sup></b>						
12–24 Vac or Vdc	S21	S22	S23	S24	SNT4RP03K	SNT4RT03K
48–60 Vac	S25	S26	S27	S28	SNT4RP05K	SNT4RT05K
48–60 Vdc	S88	S89	S90	—	SNT4RP23K	SNT4RT23K
110–240 Vac	S29	S30	S31	S32	SNT4RP11K	SNT4RT11K
110–125 Vdc	S45	S46	S47	S48	SNT4RP26K	SNT4RT26K
380–440 Vac or 220–250 Vdc	S33	S34	S35	S36	SNT4RP14K	SNT4RT14K
480–600 Vac	S37	S38	S39	S40	SNT4RP18K	SNT4RT18K

#### Notes

- ① Listed with Underwriters Laboratories, for field installation under E64983.
- ② Standard mounting location—leads exit rear of breaker.
- ③ For use with LT (thermal-magnetic) three-pole trip units only.

## N-Frame and HMCP (N) Shunt Trip

Voltage Rating (AC Frequency = 50/60 Hz)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Field Mounted Field Installation Kits ①		
	Same Side	Rear ②	Opposite Side	Terminal Block Same Side	Pigtail Leads	Terminal Block
	Suffix Number	Suffix Number	Suffix Number	Suffix Number	Catalog Number	Catalog Number
<b>Left-Pole Mounting AC/DC Ratings ②</b>						
9–24 Vac or Vdc	S01	S02	S03	S04	SNT5LP03K	SNT5LT03K
48–60 Vac	S05	S06	S07	S08	SNT5LP05K	SNT5LT05K
110–240 Vac ③	S09	S10	S11	S12	SNT5LP11K	SNT5LT11K
110–125 Vdc	S41	S42	S43	S44	SNT5LP26K	SNT5LT26K
380–440 Vac or 220–250 Vdc	S13	S14	S15	S16	SNT5LP14K	SNT5LT14K
480–600 Vac	S17	S18	S19	S20	SNT5LP18K	SNT5LT18K
48–60 Vdc	S21	S22	S23	S24	SNT5LP23K	SNT5LT23K

## R-Frame Shunt Trip (RH Only)

Voltage Rating (AC Frequency = 50/60 Hz)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads	Field Mounted Field Installation Kits ①
	Suffix Number ④	Pigtail Leads Catalog Number ④
24 Vac or Vdc	S21	SNT6P03K
48–60 Vac	S25	SNT6P05K
110–240 Vac	S29	SNT6P11K
380–440 Vac or 220–250 Vdc	S33	SNT6P14K
480–600 Vac	S37	SNT6P18K
48–60 Vdc	S88	SNT6P23K
110–125 Vdc	S45	SNT6P26K

**Notes**

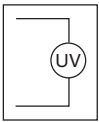
- ① Listed with Underwriters Laboratories for field installation under E64983.
- ② Standard mounting location—leads exit rear of breaker.
- ③ Supply voltages suitable for use with Class 1 GFP devices. Marking label included with accessory kits.
- ④ A maximum of two shunt trip plug-in modules may be installed in a circuit breaker.

#### 2

#### Low Energy Shunt Trip Ordering Information

Select shunt trip catalog number for the voltage within the indicated voltage range. Shunt trip coils are designed to be applied at specific AC or DC voltages within the voltage range shown. Electrical ratings are also shown on applicable circuit breaker accessory nameplates.

#### Low Energy Shunt Trip **F-, J-, K-, L-, M-, N- and R-Frames and HMCPs Low Energy Shunt Trip** <sup>①</sup>



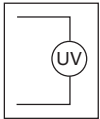
Mounting Positions (Pole)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Field Mounted Field Installation Kits <sup>②</sup> Terminal Block		
	Same Side	Rear <sup>③</sup>	Opposite Side	Same Side	Pigtail Leads	Terminal Block
	Suffix Number	Suffix Number	Suffix Number	Suffix Number	Catalog Number	Catalog Number
<b>F-Frame</b>						
Left	N01	N02	N03	N04	LST1LPK <sup>④</sup>	LST1LTK <sup>④</sup>
Right <sup>③</sup>	N05	N06	N07	N08	LST1RPK <sup>④</sup>	LST1RTK <sup>④</sup>
<b>J-Frame</b>						
Left	N01	N02	N03	—	LST2LPK	—
Right <sup>③</sup>	N05	N06	N07	—	LST2RPK	—
<b>K-Frame</b>						
Left <sup>③</sup>	N01	N02	N03	—	LST3LPK	—
Right <sup>⑤⑥</sup>	N05	N06	N07	—	LST3RPK	—
<b>L- and M-Frames</b>						
Left	N01	N02	N03	—	LST4LPK	—
Right	N05	N06	N07	—	LST4RPK	—
<b>N-Frame</b>						
Left <sup>③</sup>	N01	N02	N03	—	LST5LPK	—
<b>R-Frame</b>						
Right	N01	—	—	—	LST6RPK	—

#### Notes

- ① Cutoff provisions required in control circuit.
- ② Listed with Underwriters Laboratories for field installation under E64983.
- ③ Standard mounting location—leads exit rear of breaker.
- ④ For F-Frame HMCP, add an "M" to beginning of catalog number. Field Installation Kit referenced for factory use only, not UL listed for field installation.
- ⑤ For use with thermal-magnetic trip units only.
- ⑥ Breakers with K-Frame OPTIM 550 can only accept accessories in left pole.

**Undervoltage Release Mechanism****Ordering Information**

Select handle reset undervoltage release mechanism catalog number for the voltage within the indicated voltage range. Undervoltage release mechanism coils are designed to be applied at specific AC or DC voltages within the voltage range shown on applicable circuit breaker accessory nameplates.

**Undervoltage Release Mechanism****G-Frame Undervoltage Release Mechanism (LH Three-Pole Only)****Electrical Ratings**

Volts (AC Only)	Frequency (Hz)	Amperes	Style Numbers <sup>①②③</sup>	Factory Suffix
120	50/60	0.05	<b>1373D62G03</b>	<b>T1</b>
24	50/60	0.22	<b>1373D62G04</b>	<b>T2</b>
48	50/60	0.11	<b>1373D62G05</b>	<b>T3</b>
60	50/60	0.10	<b>1373D62G06</b>	<b>T4</b>
110	50	0.049	<b>1373D62G07</b>	<b>T5</b>
208	60	0.026	<b>1373D62G08</b>	<b>T6</b>
220	50	0.025	<b>1373D62G09</b>	<b>T7</b>
240	50/60	0.024	<b>1373D62G10</b>	<b>T8</b>
380	50	0.015	<b>1373D62G11</b>	<b>T9</b>
415	50	0.013	<b>1373D62G12</b>	<b>T10</b>
440	50	0.012	<b>1373D62G13</b>	<b>T11</b>
480	60	0.01	<b>1373D62G14</b>	<b>T12</b>

**Notes**

- ① Includes 24-inch (609.6 mm) external pigtail leads, 18 AWG (16–0.010).
- ② A maximum of two internal accessories may be mounted in a three-pole circuit breaker.
- ③ Suitable for mounting in left pole only of three-pole breaker.

G-Frame circuit breakers are factory sealed. Underwriters Laboratories requires that internal accessories be installed at the factory.

Internal accessories are UL listed for factory installation under E7819.

Where local codes and standards permit and UL listing is not required, internal accessories can be field installed. Accessory installation should be done before the circuit breaker is mounted and connected.



### F-Frame Factory Mounted (For F-Frame Breaker and F-Frame HMCP) Undervoltage Release Mechanism

Voltage Rating (AC Freq. = 50/60 Hz)	Connection Type and Location 18-Inch Pigtail Leads			Terminal Block Same Side Suffix Number
	Same Side Suffix Number	Rear <sup>①</sup> Suffix Number	Opposite Side Suffix Number	
<b>Left-Pole Mounting AC Ratings</b>				
12 Vac	U01	U02	U03	U04
24 Vac	U05	U06	U07	U08
48 Vac	U37	U38	U39	U40
60 Vac	U97	U98	U99	U100
110–127 Vac	U13	U14	U15	U16
208–240 Vac	U17	U18	U19	U20
380–480 Vac	U21	U22	U23	U24
525–600 Vac	U25	U26	U27	U28
<b>Right-Pole Mounting AC Ratings <sup>②③</sup></b>				
12 Vac	U49	U50	U51	U52
24 Vac	U53	U54	U55	U56
48 Vac	U85	U86	U87	U88
60 Vac	U101	U102	U103	U104
110–127 Vac	U61	U62	U63	U64
208–240 Vac	U65	U66	U67	U68
380–480 Vac	U69	U70	U71	U72
525–600 Vac	U73	U74	U75	U76
<b>Left-Pole Mounting DC Ratings</b>				
12 Vdc	U29	U30	U31	U32
24 Vdc	U33	U34	U35	U36
48 Vdc	U37	U38	U39	U40
60 Vdc	U97	U98	U99	U100
110–127 Vdc	U41	U42	U43	U44
220–250 Vdc	U45	U46	U47	U48
<b>Right-Pole Mounting DC Ratings <sup>②③</sup></b>				
12 Vdc	U77	U78	U79	U80
24 Vdc	U81	U82	U83	U84
48 Vdc	U85	U86	U87	U88
60 Vdc	U101	U102	U103	U104
110–127 Vdc	U89	U90	U91	U92
220–250 Vdc	U93	U94	U95	U96

#### Notes

- ① Standard pigtail lead exit location.
- ② Standard mounting location.
- ③ Not for use on right pole of four-pole circuit breaker.

F-Frame circuit breakers are factory sealed. Underwriters Laboratories requires that internal accessories be installed at the factory. Internal accessories are UL listed for factory installation under E7819.

Where local codes and standards permit and UL listing is not required, internal accessories can be field installed. Accessory installation should be done before the circuit breaker is mounted and connected.

## F-Frame Field Mounted Undervoltage Release Mechanism

Voltage Rating (AC Freq. = 50/60 Hz)	F-Frame Breaker Factory Installation Kits <sup>①</sup>		F-Frame Breaker HMCP	
	Pigtail Leads	Terminal Block	Pigtail Leads	Terminal Block
	Catalog Number	Catalog Number	Catalog Number	Catalog Number
<b>Left-Pole Mounting AC Ratings</b>				
12 Vac	UVH1LP02K	UVH1LT02K	MUVH1LP02K	MUVH1LT02K
24 Vac	UVH1LP03K	UVH1LT03K	MUVH1LP03K	MUVH1LT03K
48 Vac	UVH1LP22K	UVH1LT22K	MUVH1LP22K	MUVH1LT22K
60 Vac	UVH1LP24K	UVH1LT24K	MUVH1LP24K	MUVH1LT24K
110–127 Vac	UVH1LP08K	UVH1LT08K	MUVH1LP08K	MUVH1LT08K
208–240 Vac	UVH1LP11K	UVH1LT11K	MUVH1LP11K	MUVH1LT11K
380–480 Vac	UVH1LP15K	UVH1LT15K	MUVH1LP15K	MUVH1LT15K
525–600 Vac	UVH1LP18K	UVH1LT18K	MUVH1LP18K	MUVH1LT18K
<b>Right-Pole Mounting AC Ratings <sup>②③</sup></b>				
12 Vac	UVH1RP02K	UVH1RT02K	MUVH1RP02K	MUVH1RT02K
24 Vac	UVH1RP03K	UVH1RT03K	MUVH1RP03K	MUVH1RT03K
48 Vac	UVH1RP22K	UVH1RT22K	MUVH1RP22K	MUVH1RT22K
60 Vac	UVH1RP24K	UVH1RT24K	MUVH1RP24K	MUVH1RT24K
110–127 Vac	UVH1RP08K	UVH1RT08K	MUVH1RP08K	MUVH1RT08K
208–240 Vac	UVH1RP11K	UVH1RT11K	MUVH1RP11K	MUVH1RT11K
380–480 Vac	UVH1RP15K	UVH1RT15K	MUVH1RP15K	MUVH1RT15K
525–600 Vac	UVH1RP18K	UVH1RT18K	MUVH1RP18K	MUVH1RT18K
<b>Left-Pole Mounting DC Ratings</b>				
12 Vdc	UVH1LP20K	UVH1LT20K	MUVH1LP20K	MUVH1LT20K
24 Vdc	UVH1LP21K	UVH1LT21K	MUVH1LP21K	MUVH1LT21K
48 Vdc	UVH1LP22K	UVH1LT22K	MUVH1LP22K	MUVH1LT22K
60 Vdc	UVH1LP24K	UVH1LT24K	MUVH1LP24K	MUVH1LT24K
110–127 Vdc	UVH1LP26K	UVH1LT26K	MUVH1LP26K	MUVH1LT26K
220–250 Vdc	UVH1LP28K	UVH1LT28K	MUVH1LP28K	MUVH1LT28K
<b>Right-Pole Mounting DC Ratings <sup>②③</sup></b>				
12 Vdc	UVH1RP20K	UVH1RT20K	MUVH1RP20K	MUVH1RT20K
24 Vdc	UVH1RP21K	UVH1RT21K	MUVH1RP21K	MUVH1RT21K
48 Vdc	UVH1RP22K	UVH1RT22K	MUVH1RP22K	MUVH1RT22K
60 Vdc	UVH1RP22K	UVH1RT22K	MUVH1RP22K	MUVH1RT22K
110–127 Vdc	UVH1RP26K	UVH1RT26K	MUVH1RP26K	MUVH1RT26K
220–250 Vdc	UVH1RP28K	UVH1RT28K	MUVH1RP28K	MUVH1RT28K

**Notes**

- ① Not listed with Underwriters Laboratories, for field installation.  
 ② Standard mounting location.  
 ③ Not for use on right pole of four-pole circuit breaker.

## J-Frame and HMCP (J) Undervoltage Release Mechanism

Voltage Rating (AC Freq. = 50/60 Hz)	Factory Mounted Connection Type and Location				Field Mounted Field Installation Kits <sup>②</sup>	
	18-Inch (457.2 mm) Pigtail Leads			Terminal Block <sup>①</sup>	Pigtail Leads Catalog Number	Terminal Block <sup>③</sup> Catalog Number
	Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number	Same Side Suffix Number		
<b>Left-Pole Mounting AC Ratings <sup>④</sup></b>						
12 Vac	U05	U06	U07	U08	UVH2LP02K	UVH2LT02K
24 Vac	U09	U10	U11	U12	UVH2LP03K	UVH2LT03K
48–60 Vac	U13	U14	U15	U16	UVH2LP05K	UVH2LT05K
110–127 Vac	U17	U18	U19	U20	UVH2LP08K	UVH2LT08K
208–240 Vac	U21	U22	U23	U24	UVH2LP11K	UVH2LT11K
380–480 Vac	U25	U26	U27	U28	UVH2LP15K	UVH2LT15K
<b>Right-Pole Mounting AC Ratings <sup>③</sup></b>						
12 Vac	U37	U38	U39	U40	UVH2RP02K	UVH2RT02K
24 Vac	U41	U42	U43	U44	UVH2RP03K	UVH2RT03K
48–60 Vac	U45	U46	U47	U48	UVH2RP05K	UVH2RT05K
110–127 Vac	U49	U50	U51	U52	UVH2RP08K	UVH2RT08K
208–240 Vac	U53	U54	U55	U56	UVH2RP11K	UVH2RT11K
380–480 Vac	U57	U58	U59	U60	UVH2RP15K	UVH2RT15K
<b>Left-Pole Mounting DC Ratings <sup>④</sup></b>						
12 Vdc	T01	T02	T03	T04	UVH2LP20K	UVH2LT20K
24 Vdc	T05	T06	T07	T08	UVH2LP21K	UVH2LT21K
48–60 Vdc	T09	T10	T11	T12	UVH2LP23K	UVH2LT23K
110–127 Vdc	T13	T14	T15	T16	UVH2LP26K	UVH2LT26K
220–250 Vdc	T17	T18	T19	T20	UVH2LP28K	UVH2LT28K
<b>Right-Pole Mounting DC Ratings <sup>③</sup></b>						
12 Vdc	T21	T22	T23	T24	UVH2RP20K	UVH2RT20K
24 Vdc	T25	T26	T27	T28	UVH2RP21K	UVH2RT21K
48–60 Vdc	T29	T30	T31	T32	UVH2RP23K	UVH2RT23K
110–127 Vdc	T33	T34	T35	T36	UVH2RP26K	UVH2RT26K
220–250 Vdc	T37	T38	T39	T40	UVH2RP28K	UVH2RT28K

**Notes**

- <sup>①</sup> For electrical rating data for manual, automatic and electrical reset undervoltage release mechanisms, refer to Eaton.  
<sup>②</sup> Listed with Underwriters Laboratories for field installation under E64983.  
<sup>③</sup> Not for use on right pole of four-pole circuit breakers.  
<sup>④</sup> Standard mounting location—leads exit rear of breaker.

## K-Frame and HMCP (K) Undervoltage Release Mechanism

Voltage Rating (AC Freq. = 50/60 Hz)	Factory Mounted Connection Type and Location				Field Mounted Field Installation Kits <sup>①</sup>	
	18-Inch (457.2 mm) Pigtail Leads			Terminal Block	Pigtail Leads Catalog Number	Terminal Block Catalog Number
	Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number	Same Side Suffix Number		
<b>Left-Pole Mounting AC Ratings <sup>②</sup></b>						
12 Vac	U05	U06	U07	U08	UVH3LP02K	UVH3LT02K
24 Vac	U09	U10	U11	U12	UVH3LP03K	UVH3LT03K
48–60 Vac	U13	U14	U15	U16	UVH3LP05K	UVH3LT05K
110–127 Vac	U17	U18	U19	U20	UVH3LP08K	UVH3LT08K
208–240 Vac	U21	U22	U23	U24	UVH3LP11K	UVH3LT11K
380–480 Vac	U25	U26	U27	U28	UVH3LP15K	UVH3LT15K
<b>Right-Pole Mounting AC Ratings <sup>③④⑤</sup></b>						
12 Vac	U37	U38	U39	U40	UVH3RP02K	UVH3RT02K
24 Vac	U41	U42	U43	U44	UVH3RP03K	UVH3RT03K
48–60 Vac	U45	U46	U47	U48	UVH3RP05K	UVH3RT05K
110–127 Vac	U49	U50	U51	U52	UVH3RP08K	UVH3RT08K
208–240 Vac	U53	U54	U55	U56	UVH3RP11K	UVH3RT11K
380–480 Vac	U57	U58	U59	U60	UVH3RP15K	UVH3RT15K
<b>Left-Pole Mounting DC Ratings <sup>②</sup></b>						
12 Vdc	T01	T02	T03	T04	UVH3LP20K	UVH3LT20K
24 Vdc	T05	T06	T07	T08	UVH3LP21K	UVH3LT21K
48–60 Vdc	T09	T10	T11	T12	UVH3LP23K	UVH3LT23K
110–127 Vdc	T13	T14	T15	T16	UVH3LP26K	UVH3LT26K
220–250 Vdc	T17	T18	T19	T20	UVH3LP28K	UVH3LT28K
<b>Right-Pole Mounting DC Ratings <sup>③④⑤</sup></b>						
12 Vdc	T21	T22	T23	T24	UVH3RP20K	UVH3RT20K
24 Vdc	T25	T26	T27	T28	UVH3RP21K	UVH3RT21K
48–60 Vdc	T29	T30	T31	T32	UVH3RP23K	UVH3RT23K
110–127 Vdc	T33	T34	T35	T36	UVH3RP26K	UVH3RT26K
220–250 Vdc	T37	T38	T39	T40	UVH3RP28K	UVH3RT28K

**Notes**

- ① Listed with Underwriters Laboratories, for field installation under E64983.
- ② Standard mounting location—leads exit rear of breaker.
- ③ For use with KT (thermal-magnetic) trip units only.
- ④ Not for use on right pole of four-pole circuit breaker.
- ⑤ Breakers with K-Frame OPTIM 550 can only accept accessories in left pole.

# 2.3

## Molded Case Circuit Breakers

### Series C

2

#### L-, HMCP (L) and (M)-Frames and Undervoltage Release Mechanism

Voltage Rating (AC Freq. = 50/60 Hz)	Factory Mounted Connection Type and Location				Field Mounted Field Installation Kits <sup>①</sup>	
	18-Inch (457.2 mm) Pigtail Leads				Terminal Block	
	Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number	Same Side Suffix Number	Pigtail Leads Catalog Number	Terminal Block Catalog Number
<b>Left-Pole Mounting AC Ratings <sup>②</sup></b>						
12 Vac	U05	U06	U07	U08	UVH4LP02K	UVH4LT02K
24 Vac	U09	U10	U11	U12	UVH4LP03K	UVH4LT03K
48–60 Vac	U13	U14	U15	U16	UVH4LP05K	UVH4LT05K
110–127 Vac	U17	U18	U19	U20	UVH4LP08K	UVH4LT08K
208–240 Vac	U21	U22	U23	U24	UVH4LP11K	UVH4LT11K
380–480 Vac	U25	U26	U27	U28	UVH4LP15K	UVH4LT15K
<b>Right-Pole Mounting AC Ratings <sup>③④</sup></b>						
12 Vac	U37	U38	U39	U40	UVH4RP02K	UVH4RT02K
24 Vac	U41	U42	U43	U44	UVH4RP03K	UVH4RT03K
48–60 Vac	U45	U46	U47	U48	UVH4RP05K	UVH4RT05K
110–127 Vac	U49	U50	U51	U52	UVH4RP08K	UVH4RT08K
208–240 Vac	U53	U54	U55	U56	UVH4RP11K	UVH4RT11K
380–480 Vac	U57	U58	U59	U60	UVH4RP15K	UVH4RT15K
<b>Left-Pole Mounting DC Ratings <sup>②</sup></b>						
12 Vdc	T01	T02	T03	T04	UVH4LP20K	UVH4LT20K
24 Vdc	T05	T06	T07	T08	UVH4LP21K	UVH4LT21K
48–60 Vdc	T09	T10	T11	T12	UVH4LP23K	UVH4LT23K
110–127 Vdc	T13	T14	T15	T16	UVH4LP26K	UVH4LT26K
220–250 Vdc	T17	T18	T19	T20	UVH4LP28K	UVH4LT28K
<b>Right-Pole Mounting DC Ratings <sup>③④</sup></b>						
12 Vdc	T21	T22	T23	T24	UVH4RP20K	UVH4RT20K
24 Vdc	T25	T26	T27	T28	UVH4RP21K	UVH4RT21K
48–60 Vdc	T29	T30	T31	T32	UVH4RP23K	UVH4RT23K
110–127 Vdc	T33	T34	T35	T36	UVH4RP26K	UVH4RT26K
220–250 Vdc	T37	T38	T39	T40	UVH4RP28K	UVH4RT28K

#### Notes

- ① Listed with Underwriters Laboratories for field installation under E64983.
- ② Standard mounting location—leads exit rear of breaker.
- ③ For use with LT (thermal-magnetic) trip units only.
- ④ Not for use on right pole of four-pole circuit breaker.

**N-Frame and HMCP (N) Undervoltage Release Mechanism**

Voltage Rating (AC Freq. = 50/60 Hz)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads				Field Mounted Field Installation Kits <sup>①</sup>	
	Same Side		Opposite Side	Terminal Block		
	Suffix Number	Rear <sup>②</sup> Suffix Number		Same Side	Pigtail Leads	Terminal Block
	Suffix Number	Suffix Number	Suffix Number	Suffix Number	Catalog Number	Catalog Number
<b>Left-Pole Mounting AC Ratings <sup>②</sup></b>						
12 Vac	U05	U06	U07	U08	UVH5LP02K	UVH5LT02K
24 Vac	U09	U10	U11	U12	UVH5LP03K	UVH5LT03K
48–60 Vac	U13	U14	U15	U16	UVH5LP05K	UVH5LT05K
110–127 Vac	U17	U18	U19	U20	UVH5LP08K	UVH5LT08K
208–240 Vac	U21	U22	U23	U24	UVH5LP11K	UVH5LT11K
380–480 Vac	U25	U26	U27	U28	UVH5LP29K	UVH5LT29K
<b>Left-Pole Mounting DC Ratings <sup>②</sup></b>						
12 Vdc	T01	T02	T03	T04	UVH5LP20K	UVH5LT20K
24 Vdc	T05	T06	T07	T08	UVH5LP21K	UVH5LT21K
48–60 Vdc	T09	T10	T11	T12	UVH5LP23K	UVH5LT23K
110–127 Vdc	T13	T14	T15	T16	UVH5LP26K	UVH5LT26K
220–250 Vdc	T17	T18	T19	T20	UVH5LP28K	UVH5LT28K

**R-Frame Undervoltage Release Mechanism (RH only)**

Voltage Rating (AC Frequency = 50/60 Hz)	Factory Mounted	Field Mounted
	Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads Suffix Number <sup>④</sup>	Field Installation Kits <sup>③</sup> Pigtail Leads Catalog Number <sup>④</sup>
12 Vac	U37	UVH6RP02K
24 Vac	U41	UVH6RP03K
48–60 Vac	U45	UVH6RP05K
110–127 Vac	U49	UVH6RP08K
208–240 Vac	U53	UVH6RP11K
380–500 Vac	U57	UVH6RP29K
12 Vdc	T21	UVH6RP20K
24 Vdc	T25	UVH6RP21K
48–60 Vdc	T29	UVH6RP23K
110–125 Vdc	T33	UVH6RP26K
220–250 Vdc	T37	UVH6RP28K

**Notes**

- ① Listed with Underwriters Laboratories for field installation under E64983.  
 ② Standard mounting location—leads exit rear of breaker.  
 ③ Endurance: 500 electrical operations plus 2500 mechanical operations.  
 ④ Pigtail wire size: 18 AWG (0.82 mm<sup>2</sup>). Leads are orange and brown.

**Accessory Terminal Block (R-Frame)**

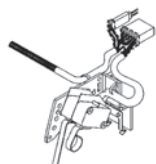
2

**Accessory Terminal Block (R-Frame)****R-Frame Accessory Terminal Block** ①

Factory Installed Suffix Number	Field Mounted Catalog Number
Q01	TBRDK

**Number of Control Wires for Each Internally Mounted Accessory**

Type of Accessory	Number of Contacts per Single Accessory	Required Number of Wires
Auxiliary switch	2a/2b 4a/4b	6 12
Alarm (Signal)/ Lockout switch	1m/1b 2m/2b	6 12
Shunt trip	N/A	2
Low energy shunt	N/A	2
Undervoltage release mechanism	N/A	2

**PowerNet and Zone Interlock Kits (OPTIM 550 Only)  
K-, L- and N-Frames****PowerNet and Zone  
Interlock Kits****PowerNet Interlock Kit** ②

Circuit Breaker	Factory Install Suffix	Catalog Number
K-Frame	PN	ICK550K
L-Frame	PN	ICK550L
N-Frame	PN	ICK550N

**Zone Interlock/Ground Kit** ②③

Circuit Breaker	Factory Install Suffix	Catalog Number
K-Frame	ZG	ZGK550K
L-Frame	ZG	ZGK550L
N-Frame	ZG	ZGK550N

**PowerNet and Zone Interlock/Ground Kit** ②③

Circuit Breaker	Factory Install Suffix	Catalog Number
K-Frame	ZGP	ZGPK550K
L-Frame	ZGP	ZGPK550L
N-Frame	ZGP	ZGPK550N

**Notes**

- ① One 24-point accessory terminal block provided with circuit breaker when ordered factory installed or shipped from warehouse as separate item when ordered for field installation. See Digitrip RMS master connection diagram (IL 29C714).
- ② Installation of these kits restrict any other attachments from being installed in the RH pole.
- ③ Includes a ground fault alarm signal that can drive the ground fault alarm unit (catalog number GFAU).

## Technical Data and Specifications

### Alarm Switch

#### F-Frame Electrical Rating Data <sup>①②</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
<b>Multi-Pole Circuit Breakers</b>			
600	50/60 Hz	6	2500
125	DC	0.50 <sup>③</sup>	2500
250	DC	0.25 <sup>③</sup>	2500
<b>Single-Pole Circuit Breakers</b>			
125/250	50/60 Hz	6 <sup>④</sup>	2000
28	DC	3 <sup>④</sup>	2000
28	DC	5 <sup>④</sup>	2000

#### J-Frame Electrical Rating Data <sup>⑤⑥</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>③</sup>	2500
250	DC	0.25 <sup>③</sup>	2500

#### K-Frame Electrical Rating Data <sup>⑥⑦</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>③</sup>	2500
250	DC	0.25 <sup>③</sup>	2500

#### L- and M-Frames Electrical Rating Data <sup>⑥⑦</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>③</sup>	2500
250	DC	0.25 <sup>③</sup>	2500

#### N-Frame Electrical Rating Data <sup>⑧</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>③</sup>	2500
250	DC	0.25 <sup>③</sup>	2500

#### R-Frame Electrical Rating Data <sup>⑧⑩</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>③</sup>	2500
250	DC	0.25 <sup>③</sup>	2500

#### Notes

- ① Endurance: 6000 electrical operations plus 4000 mechanical operations.
- ② Endurance: 6000 electrical operations plus 2000 mechanical operations.
- ③ Non-inductive load.
- ④ Inductive (L/R = 0.026).
- ⑤ Endurance: 6000 electrical operations plus 2000 mechanical operations.
- ⑥ Pigtail wire size: 18 AWG (0.82 mm<sup>2</sup>).
- ⑦ Endurance: 5000 electrical operations plus 1000 mechanical operations.
- ⑧ Endurance: 3000 electrical operations plus 1000 mechanical operations.
- ⑨ Endurance: 500 electrical operations plus 2500 mechanical operations.
- ⑩ Pigtail wire size: 18 AWG (0.82 mm<sup>2</sup>). Leads are red, black and blue.



# 2.3

## Molded Case Circuit Breakers

### Series C

#### Auxiliary Switch

2

#### F-Frame Electrical Rating Data <sup>①②</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
125 <sup>③</sup>	50/60 Hz	1	2500
600	50/60 Hz	6	2500
125	DC	0.50 <sup>④</sup>	2500
250	DC	0.25 <sup>④</sup>	2500

#### J-Frame Electrical Rating Data <sup>①②</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>④</sup>	2500
250	DC	0.25 <sup>④</sup>	2500

#### K-Frame Electrical Rating Data <sup>②⑤</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>④</sup>	2500
250	DC	0.25 <sup>④</sup>	2500

#### L- and M-Frames Electrical Rating Data <sup>②</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>④</sup>	2500
250	DC	0.25 <sup>④</sup>	2500

#### N-Frame Electrical Rating Data <sup>②⑥</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>④</sup>	2500
250	DC	0.25 <sup>④</sup>	2500

#### R-Frame Electrical Rating Data <sup>⑦⑧</sup>

Maximum Voltage	Frequency	Maximum Current Amperes
600	50/60 Hz	6
125	DC	0.50 <sup>④</sup>
250	DC	0.25 <sup>④</sup>

#### Notes

- ① Endurance: 6000 electrical operations plus 4000 mechanical operations.
- ② Pigtail wire size: 18 AWG (0.82 mm<sup>2</sup>).
- ③ For use in electronic circuit of 100 micro amperes and 15 Vdc minimum.
- ④ Non-inductive load.
- ⑤ Endurance: 5000 electrical operations plus 1000 mechanical operations.
- ⑥ Endurance: 3000 electrical operations plus 1000 mechanical operations.
- ⑦ Endurance: 500 electrical operations plus 2500 mechanical operations.
- ⑧ Pigtail wire size: 18 AWG (0.82 mm<sup>2</sup>). Leads are red, black and blue.

**Auxiliary Switch and Alarm Switch Combination****F-Frame Electrical Rating Data** <sup>①②</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>③</sup>	2200
250	DC	0.25 <sup>③</sup>	2200

**J-Frame Electrical Rating Data** <sup>②④</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>③</sup>	2500
250	DC	0.25 <sup>③</sup>	2500

**K-Frame Electrical Rating Data** <sup>②⑤</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>③</sup>	2500
250	DC	0.25 <sup>③</sup>	2500

**L- and M-Frames Electrical Rating Data** <sup>②⑤</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>③</sup>	2500
250	DC	0.25 <sup>③</sup>	2500

**N-Frame Electrical Rating Data** <sup>②⑥</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>③</sup>	2500
250	DC	0.25 <sup>③</sup>	2500

**Notes**

- ① Endurance: 6000 electrical operations plus 4000 mechanical operations.
- ② Pigtail wire size: 18 AWG (0.82 mm<sup>2</sup>).
- ③ Non-inductive load.
- ④ Endurance: 6000 electrical operations plus 2000 mechanical operations.
- ⑤ Endurance: 5000 electrical operations plus 1000 mechanical operations.
- ⑥ Endurance: 3000 electrical operations plus 1000 mechanical operations.

# 2.3

## Molded Case Circuit Breakers

### Series C

#### Shunt Trip

2

#### F-Frame Electrical Rating Data <sup>①②③</sup>

50/60 Hz			DC		
Supply Voltage	Minimum Operating Voltage	VA	Supply Voltage	Minimum Operating Voltage	VA
12	6.75	75	12	9	100
24	6.75	300	24	9	400
48	36	92	48	36	100
60	36	140	60	36	160
110	156	480	110	77	55
120	156	570	120	77	66
127	156	640	125	77	71
208	156	180	—	—	—
220	156	200	—	—	—
240	156	240	—	—	—
380	300	610	127	—	72
415	300	130	220	—	110
440	300	330	250	—	140
480	300	380	—	—	—
525	300	450	—	—	—
550	300	530	—	—	—
600	300	590	—	—	—

#### J-Frame Electrical Rating Data <sup>①②④</sup>

50/60 Hz			DC		
Supply Voltage	Minimum Operating Voltage	VA	Supply Voltage	Minimum Operating Voltage	VA
12	9	31	12	8.4	50
24	9	173	24	8.4	247
48	36	686	48	33.6	1094
60	36	1014	60	33.6	1698
110 <sup>⑤</sup>	60.5	66	110	77	112
120 <sup>⑤</sup>	60.5	84	120	77	138
127 <sup>⑤</sup>	60.5	102	125	77	150
208 <sup>⑤</sup>	60.5	354	—	77	—
220 <sup>⑤</sup>	60.5	396	—	—	—
240 <sup>⑤</sup>	60.5	432	—	—	—
380	285	180	110	154	40
400	285	200	120	154	58
415	285	240	125	154	—
440	285	610	127	154	—
480	360	34	—	—	—
525	360	42	—	—	—
550	360	50	—	—	—
600	360	60	—	—	—

#### K-Frame Electrical Rating Data <sup>⑥⑦⑧</sup>

50/60 Hz			DC		
Supply Voltage	Minimum Operating Voltage	VA	Supply Voltage	Minimum Operating Voltage	VA
12	9	45	12	8.4	35
24	9	200	24	8.4	170
48	—	830	48	—	710
60	—	1280	60	—	1105
110 <sup>⑤</sup>	60	100	110	77	110
120 <sup>⑤</sup>	60	120	120	77	130
127 <sup>⑤</sup>	60	140	125	77	140
208 <sup>⑤</sup>	60	420	—	—	—
220 <sup>⑤</sup>	60	470	—	—	—
240 <sup>⑤</sup>	60	550	—	—	—
380	285	95	220	154	41
400	285	108	250	154	54
415	285	120	—	154	—
440	285	136	—	154	—
480	360	40	—	—	—
525	360	50	—	—	—
550	360	50	—	—	—
600	360	70	—	—	—

#### Notes

- ① Average unlatching time: 6 milliseconds.
- ② Average circuit breaker contact total opening time: 18 milliseconds.
- ③ Endurance: 6000 electrical operations plus 4000 mechanical operations.
- ④ Endurance: 6000 electrical operations plus 2000 mechanical operations.
- ⑤ Supply voltages suitable for use with Class 1 GFP devices. Marking label included with accessory kits.
- ⑥ Approximate unlatching time: 6 milliseconds.
- ⑦ Approximate total circuit breaker contact opening time: 8 milliseconds.
- ⑧ Endurance: 5000 electrical operations plus 1000 mechanical operations.

L- and M-Frame Electrical Rating Data <sup>①②③</sup>

50/60 Hz			DC		
Supply Voltage	Minimum Operating Voltage	VA	Supply Voltage	Minimum Operating Voltage	VA
12	9	45	12	9	35
24	9	200	24	9	170
48	34	830	48	34	710
60	34	1280	60	34	1105
110 <sup>④</sup>	60	100	110	77	110
120 <sup>④</sup>	60	120	120	77	130
127 <sup>④</sup>	60	140	125	77	140
208 <sup>④</sup>	60	420	—	77	—
220 <sup>④</sup>	60	470	—	—	—
240 <sup>④</sup>	60	550	—	—	—
380	266	95	220	154	41
400	266	108	250	—	54
415	266	120	—	—	—
440	266	136	—	—	—
480	336	40	—	—	—
525	336	50	—	—	—
550	336	50	—	—	—
600	336	70	—	—	—

N-Frame Electrical Rating Data <sup>①②⑤</sup>

50/60 Hz			DC		
Supply Voltage	Minimum Operating Voltage	VA	Supply Voltage	Minimum Operating Voltage	VA
24	16.8	200	24	16.8	170
48	33.6	830	48	33.6	710
60	33.6	1280	60	33.6	1150
110 <sup>④</sup>	60	100	110	77	110
120 <sup>④</sup>	60	120	120	77	130
127 <sup>④</sup>	60	140	125	77	140
208 <sup>④</sup>	60	420	—	—	—
220 <sup>④</sup>	60	470	—	—	—
240 <sup>④</sup>	60	550	—	—	—
380	266	95	220	154	41
400	266	108	250	—	54
415	266	120	—	—	—
440	266	136	—	—	—
480	336	40	—	—	—
525	336	50	—	—	—
550	336	50	—	—	—
600	336	70	—	—	—

**Notes**

- ① Approximate unlatching time: 6 milliseconds.
- ② Approximate total circuit breaker contact opening time: 18 milliseconds.
- ③ Endurance: 5000 electrical operations plus 1000 mechanical operations.
- ④ Supply voltages suitable for use with Class 1 GFP devices. Marking label included with accessory kits.
- ⑤ Endurance: 3000 electrical operations plus 1000 mechanical operations.

# 2.3

## Molded Case Circuit Breakers

### Series C

2

#### R-Frame Electrical Rating Data <sup>①②③④⑤⑥</sup>

Suffix Number	Application Ratings		Electrical Operating Ratings						VA	One Minute Dielectric Withstand Voltage (V)
	Voltage (V)	Frequency (Hz)	Supply Voltage (V)	Minimum Operating Voltage (V)	I <sub>p</sub> (A)	I <sub>rms</sub> at 0.250s (A)	I <sub>rms</sub> at 0.033s (A)			
03/03K	24	50/60	24	16.8	36.1	—	25.5	612	1050	
	24	DC	24	16.8	36.1	16.5	—	396	1050	
05/05K	48–60	50/60	48	34.0	13.1	—	9.2	450	1120	
	48–60	50/60	60	34.0	17.2	—	12.2	740	1120	
11/11K <sup>③</sup>	110–240	50/60	110	60.5	4.2	—	3.0	330	1480	
	110–240	50/60	120	60.5	4.5	—	3.2	390	1480	
	110–240	50/60	127	60.5	4.6	—	3.3	430	1480	
	110–240	50/60	208	60.5	7.9	—	5.6	1170	1480	
	110–240	50/60	220	60.5	8.5	—	6.0	1370	1480	
	110–240	50/60	240	60.5	8.7	—	6.1	1470	1480	
14/14K	380–440	50/60	380	266.0	4.5	—	3.2	1220	1880	
	380–440	50/60	415	266.0	5.0	—	3.6	1500	1880	
	380–440	50/60	440	266.0	5.3	—	3.7	1640	1880	
	220–250	DC	220	154.0	—	2.4	—	530	1500	
	220–250	DC	250	154.0	—	2.7	—	680	1500	
18/18K	480–600	50/60	480	336.0	0.6	—	0.4	200	2200	
	480–600	50/60	525	336.0	0.7	—	0.5	270	2200	
	480–600	50/60	550	336.0	0.7	—	0.5	280	2200	
	480–600	50/60	600	336.0	0.8	—	0.6	360	2200	
23/23K	48–60	DC	48	34.0	—	9.8	—	470	1120	
	48–60	DC	60	34.0	—	11.6	—	700	1120	
26/26K	110–125	DC	110	77.0	—	3.3	—	370	1250	
	110–125	DC	120	77.0	—	3.6	—	440	1250	
	110–125	DC	125	77.0	—	3.8	—	480	1250	

#### Notes

- ① Approximate unlatching time of 6 milliseconds.
- ② Average circuit breaker contact total opening time approximately 62 milliseconds, at rated voltage.
- ③ Endurance: 500 electrical operations and 2500 mechanical operations.
- ④ Shunt trip can be operated up to a maximum of six times per minute.
- ⑤ Maximum operating voltage—110% of maximum voltage range rating.
- ⑥ Pigtail wire size: 18 AWG (0.82 mm<sup>2</sup>). Leads are yellow and white.

**Undervoltage Release Mechanism****F-Frame Electrical Rating Data** <sup>①</sup>

50/60 Hz					DC				
Supply Voltage	Dropout Voltage		Pickup Voltage	VA	Supply Voltage	Dropout Voltage		Pickup Voltage	VA
	Minimum	Maximum	Maximum			Minimum	Maximum	Maximum	
12	4.2	6.3	7.6	1.3	12	4.2	8.4	10.2	2.8
12	4.2	6.3	7.6	2.5	12	4.2	8.4	10.2	2.8
24	8.4	16.8	20.4	1.4	24	8.4	16.8	20.4	1.6
48	21.0	33.6	40.8	1.2	48	21.0	33.6	40.8	1.3
60	21.0	33.6	40.8	1.9	60	21.0	33.6	40.8	2.0
110	44.5	77.0	93.5	1.3	110	44.5	77.0	93.5	1.5
120	44.5	77.0	93.5	1.5	120	44.5	77.0	93.5	1.7
127	44.5	77.0	93.5	1.7	125	44.5	77.0	93.5	1.9
208	84.0	145.6	176.8	2.2	220	87.5	154.0	187.0	2.6
220	84.0	145.6	176.8	2.4	250	87.5	154.0	187.0	3.4
240	84.0	145.6	176.8	2.9	—	—	—	—	—
380	168.0	266.0	323.0	2.9	—	—	—	—	—
415	168.0	266.0	323.0	3.5	—	—	—	—	—
440	168.0	266.0	323.0	3.9	—	—	—	—	—
480	168.0	266.0	323.0	4.6	—	—	—	—	—
525	210.0	367.0	446.0	4.3	—	—	—	—	—
550	210.0	367.0	446.0	4.8	—	—	—	—	—
600	210.0	367.0	446.0	5.8	—	—	—	—	—

**J-Frame Electrical Rating Data** <sup>②③</sup>

50/60 Hz					DC				
Supply Voltage	Dropout Voltage		Pickup Voltage	VA	Supply Voltage	Dropout Voltage		Pickup Voltage	VA
	Minimum	Maximum	Maximum			Minimum	Maximum	Maximum	
12	4.2	8.4	10.2	1.9	12	4.2	8.4	10.2	1.6
24	8.4	16.8	20.4	3.9	24	8.4	16.8	20.4	3.1
48	21.0	33.6	40.8	2.5	48	21.0	33.6	40.8	2.0
60	21.0	33.6	40.8	3.8	60	21.0	33.6	40.8	3.1
110	44.5	77.0	93.5	1.8	110	44.5	77.0	93.5	1.6
120	44.5	77.0	93.5	2.1	120	44.5	77.0	93.5	1.9
127	44.5	77.0	93.5	2.4	125	44.5	77.0	93.5	2.2
208	84.0	145.6	176.8	2.7	220	87.5	154.0	187.0	3.1
220	84.0	145.6	176.8	3.1	250	87.5	154.0	187.0	4.0
240	84.0	145.6	176.8	3.8	—	—	—	—	—
380	168.0	266.0	323.0	3.4	—	—	—	—	—
415	168.0	266.0	323.0	4.0	—	—	—	—	—
440	168.0	266.0	323.0	4.6	—	—	—	—	—
480	168.0	266.0	323.0	5.4	—	—	—	—	—

**Notes**

- ① Endurance: 6000 electrical operations plus 4000 mechanical operations.  
 ② Endurance: 6000 electrical operations plus 2000 mechanical operations.  
 ③ For electrical rating data for manual, automatic and electrical reset undervoltage release mechanisms, refer to Eaton.

# 2.3

## Molded Case Circuit Breakers

### Series C

2

#### K-Frame Electrical Rating Data <sup>①</sup>

50/60 Hz					DC				
Supply Voltage	Dropout Voltage		Pickup Voltage	VA	Supply Voltage	Dropout Voltage		Pickup Voltage	VA
	Minimum	Maximum	Maximum			Minimum	Maximum	Maximum	
12	4.2	8.4	10.2	1.9	12	4.2	8.4	10.2	1.6
24	8.4	16.8	20.4	3.9	24	8.4	16.8	20.4	3.1
48	21.0	33.6	40.8	2.5	48	21.0	33.6	40.8	2.0
60	21.0	33.6	40.8	3.8	60	21.0	33.6	40.8	3.1
110	44.5	77.0	93.5	1.8	110	44.5	77.0	93.5	1.6
120	44.5	77.0	93.5	2.1	120	44.5	77.0	93.5	1.9
127	44.5	77.0	93.5	2.4	125	44.5	77.0	93.5	2.2
208	84.0	145.6	176.8	2.7	220	87.5	154.0	187.0	3.1
220	84.0	145.6	176.8	3.1	250	87.5	154.0	187.0	4.0
240	84.0	145.6	176.8	3.8	—	—	—	—	—
380	168.0	266.0	323.0	3.4	—	—	—	—	—
415	168.0	266.0	323.0	4.0	—	—	—	—	—
440	168.0	266.0	323.0	4.6	—	—	—	—	—
480	168.0	266.0	323.0	5.4	—	—	—	—	—

#### L- and M-Frames Electrical Rating Data <sup>①</sup>

50/60 Hz					DC				
Supply Voltage	Dropout Voltage		Pickup Voltage	VA	Supply Voltage	Dropout Voltage		Pickup Voltage	VA
	Minimum	Maximum	Maximum			Minimum	Maximum	Maximum	
12	4.2	8.4	10.2	1.9	12	4.2	8.4	10.2	1.6
24	8.4	16.8	20.4	3.9	24	8.4	16.8	20.4	3.1
48	21.0	33.6	40.8	2.5	48	21.0	33.6	40.8	2.0
60	21.0	33.6	40.8	3.8	60	21.0	33.6	40.8	3.1
110	44.5	77.0	93.5	1.8	110	44.5	77.0	93.5	1.6
120	44.5	77.0	93.5	2.1	120	44.5	77.0	93.5	1.9
127	44.5	77.0	93.5	2.4	125	44.5	77.0	93.5	2.2
208	84.0	145.6	176.8	2.7	220	87.5	154.0	187.0	3.1
220	84.0	145.6	176.8	3.1	250	87.5	154.0	187.0	4.0
240	84.0	145.6	176.8	3.8	—	—	—	—	—
380	168.0	266.0	323.0	3.4	—	—	—	—	—
415	168.0	266.0	323.0	4.0	—	—	—	—	—
440	168.0	266.0	323.0	4.6	—	—	—	—	—
480	168.0	266.0	323.0	5.4	—	—	—	—	—

**Note**

<sup>①</sup> Endurance: 5000 electrical operations plus 1000 mechanical operations.

**N-Frame Electrical Rating Data** <sup>①</sup>

50/60 Hz					DC				
Supply Voltage	Dropout Voltage		Pickup Voltage	VA	Supply Voltage	Dropout Voltage		Pickup Voltage	VA
	Minimum	Maximum	Maximum			Minimum	Maximum	Maximum	
12	4.2	8.4	10.2	1.9	12	4.2	8.4	10.2	1.6
24	8.4	16.8	20.4	3.9	24	8.4	16.8	20.4	3.1
48	21.0	33.6	40.8	2.5	48	21.0	33.6	40.8	2.0
60	21.0	33.6	40.8	3.8	60	21.0	33.6	40.8	3.1
110	44.5	77.0	93.5	1.8	110	44.5	77.0	93.5	1.6
120	44.5	77.0	93.5	2.1	120	44.5	77.0	93.5	1.9
127	44.5	77.0	93.5	2.4	125	44.5	77.0	93.5	2.2
208	84.0	145.6	176.8	2.7	220	87.5	154.0	187.0	3.1
220	84.0	145.6	176.8	3.1	220	87.5	154.0	187.0	—
240	84.0	145.6	176.8	3.8	250	—	—	—	4.0
380	175.0	266.0	323.0	3.4	—	—	—	—	—
415	175.0	266.0	323.0	4.0	—	—	—	—	—
480	175.0	266.0	323.0	4.6	—	—	—	—	—
500	175.0	266.0	323.0	5.4	—	—	—	—	—

**Note**

<sup>①</sup> Endurance: 3000 electrical operations plus 1000 mechanical operations.



# 2.3

## Molded Case Circuit Breakers

### Series C

2

#### R-Frame AC Undervoltage Release Mechanism (Handle Reset) Ratings <sup>①②</sup>

Catalog Suffix	Application Ratings Voltage (V)	Electrical Operating Ratings			Approximate Operating Time (ms)				Maximum Circuit Breaker Contact Opening	Dielectric Withstand Voltage (V) <sup>⑤</sup>
		Supply Voltage (V)	Dropout Voltage (V)		Pickup Voltage (V) Max.	VA	Minimum UVR Response <sup>③</sup>	Initiation Circuit Breaker Contact Separation <sup>④</sup>		
02/02K	12	12	4.2	8.4	10.2	2.3	5	46	77	1024
03/03K	24	24	8.4	16.8	20.4	3.1	5	46	77	1048
05/05K	48–60	48	21.0	33.5	40.8	3.4	5	46	77	1120
		60	21.0	33.5	40.8	6.0	5	46	77	1120
08/08K	110–127	110	44.5	77.0	93.5	3.3	5	46	77	1254
		120	44.5	77.0	93.5	3.6	5	46	77	1254
		127	44.5	77.0	93.5	3.8	5	46	77	1254
11/11K	208–240	208	84.0	145.6	176.8	4.2	5	46	77	1480
		220	84.0	145.6	176.8	6.6	5	46	77	1480
		240	84.0	145.6	176.8	7.2	5	46	77	1480
29/29K	380–500	380	168.0	266.0	323.0	3.8	5	46	77	2000
		415	168.0	266.0	323.0	8.3	5	46	77	2000
		440	168.0	266.0	323.0	8.8	5	46	77	2000
		480	168.0	266.0	323.0	9.6	5	46	77	2000
		500	168.0	266.0	323.0	10.0	5	46	77	2000

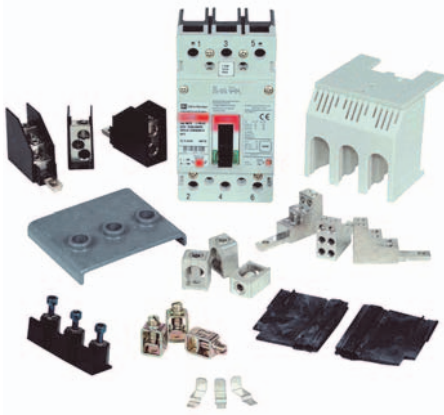
#### R-Frame DC Undervoltage Release Mechanism (Handle Reset) Ratings <sup>①②</sup>

Catalog Suffix	Application Ratings Voltage (V)	Electrical Operating Ratings			Approximate Operating Time (ms)				Maximum Circuit Breaker Contact Opening	Dielectric Withstand Voltage (V) <sup>⑤</sup>
		Supply Voltage (V)	Dropout Voltage (V)		Pickup Voltage (V) Max.	VA	Minimum UVR Response <sup>③</sup>	Initiation Circuit Breaker Contact Separation <sup>④</sup>		
20/20K	12	12	4.2	8.4	10.2	3.4	5	46	77	1024
21/21K	24	24	8.4	16.8	20.4	4.3	5	46	77	1048
23/23K	48–60	48	21.0	33.5	40.8	4.8	5	46	77	1120
		60	21.0	33.5	40.8	7.2	5	46	77	1120
26/26K	110–127	110	43.8	77.0	93.5	3.3	5	46	77	1250
		120	43.8	77.0	93.5	3.6	5	46	77	1250
		125	43.8	77.0	93.5	3.8	5	46	77	1250
28/28K	220–250	220	87.5	154.0	187.0	6.6	5	46	77	1500
		250	87.5	154.0	187.0	7.5	5	46	77	1500

#### Notes

- ① Endurance: 500 electrical operations plus 2500 mechanical operations.
- ② Pigtail wire size: 18 AWG (0.82 mm<sup>2</sup>). Leads are orange and brown.
- ③ UVR will override a momentary voltage dip up to the response time shown.
- ④ Unlatching occurs 1 millisecond before circuit breaker contacts begin to separate.
- ⑤ For 1 minute.

Series C External Accessories



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External Accessories

Product Overview

**End Cap Kit**

The end cap kit slides onto the line or load conductor of the circuit breaker and acts as a threaded adapter for the conductor to accept a ring terminal or other bolt-on connector. The end cap kit is available with English and metric thread sizes. (Field installation only.) Listed per UL File E7819.

**Keeper Nut**

The keeper nut slides onto the line or load conductor of the circuit breaker and acts as a threaded adapter for the conductor to accept a ring terminal or other bolt-on connector. The keeper nut is available with English and metric thread sizes. Screws and washers are supplied by customer. (Field installation only.) Listed per UL File E7819.

**L-, M-, N-Frames**

Not required. Terminals are threaded.

**J-Frame Plug Nut**

The plug nut is used in applications where screw-connected ring-type terminals are preferred to connect cables to circuit breaker conductors. The plug nut is press-fit into the opening in the circuit breaker terminal conductor. Screws and washers are supplied by customer.

**Terminal Adapter**

**Control Wire Terminal Kit**

The control wire terminal kit provides a means to tap off control power from a main disconnect, using the provided male end of a quick disconnect.

For use with steel or stainless steel terminals only.

**Note:** Terminal Kits contain one terminal for each pole and one terminal cover.

**Multiwire Connectors**

Eaton’s field-installed multiwire connectors for the load side (OFF) end terminals, are used to distribute the load from the circuit breaker to multiple devices without the use of separate distribution terminal blocks.

Multiwire lug kits include mounting hardware, insulators and tin-plated aluminum connectors to replace three mechanical load lugs. UL listed as used on the load side (OFF) end.

**Terminal Shields**

Terminal shields provide protection against accidental contact with live line side terminations. Terminal shields are fabricated from high dielectric insulating material and fasten over the front terminal access openings. Small openings in the shields provide limited access to the terminals for tightening connectors. (Field installation only.)

**Terminal End Covers**

The terminal end covers are designed for use in motor control center applications where, because of confined spaces, line side conductors are normally custom fitted. The molded end covers are made of high dielectric glass-polyester and slide over the line ends of the circuit breaker. Close fitting conductor openings are molded into the end covers. The end cover and circuit breaker case fit together to form terminal compartments that isolate discharged ionizing gases during circuit breaker tripping. Terminal end covers are available with two conductor opening diameters, 0.25-inch (6.4 mm) and 0.41-inch (10.4 mm), and are listed per UL File E7819. (Field installation only.)

**Interphase Barriers**

The interphase barriers provide additional electrical clearance between circuit breaker poles for special termination applications. The barriers are high dielectric insulating plates that are installed in the molded slots between the terminals. (Field installation only.) Two per package.

**Base Mounting Plate**

Suitable for mounting six single-pole circuit breakers.

**DIN Rail Adapter**

For use with standard 35 mm DIN rail such as, 35 x 7.5 or 35 x 15 mm per DIN EN50022.

Adapter mounting screws included are for use with two- and three-pole circuit breakers. Adapters for single-pole circuit breakers clip into the base molding.

**Key Operated Attachment****Lock Dog (Non-Padlockable)****Non-Padlockable Handle Block**

The non-padlockable handle block secures the circuit breaker handle in either the ON or OFF position. (Trip-free operation allows the circuit breaker to trip when the

handle block holds the circuit breaker handle in the ON position.) The device is positioned over the circuit breaker handle and secured by a setscrew to deter accidental operation of the circuit breaker handle. Listed per UL File E7819. (Field installation only.)

**Padlockable Handle****Padlockable Handle Lock**

The device is positioned in the cover opening to prevent handle movement. Will accommodate one 5/16-inch (8 mm) padlock.

**Snap-on Padlockable Handle Lock Hasp**

The snap-on padlockable handle lock allows the handle to be locked in the OFF or ON position. (Trip-free operation allows the circuit breaker to trip when the handle lock holds the circuit breaker handle in the ON position.) This device was designed for use on the single-pole circuit breaker, but may be used on one-, two-, three- and four-pole styles. The handle lock snaps onto the escutcheon area of the handle with an optional retaining screw for added secureness. The handle lock will accommodate one padlock with a 1/4-inch (6.4 mm) shackle. Listed per UL File E7819. (Field installation only.)

**Padlockable Handle Lock Hasp**

The padlockable handle lock hasp allows the handle to be locked in the ON or OFF position. (Trip-free operation allows the circuit breaker to trip when the handle lock holds the circuit breaker handle in the ON position.) The hasp mounts on the circuit breaker cover within the trimline. The cover is predrilled on both sides of the operating handle so that the hasp can be mounted on either side of the handle. The hasp will accommodate up to three padlocks with 1/4-inch (6.4 mm) shackles, one per circuit breaker. Listed per UL File E7819. (Field installation only.)

**Cylinder Lock**

The cylinder lock internally blocks the trip bar in the tripped position to prevent the circuit breaker from being switched to ON. The cylinder lock is factory installed in the left pole only of the circuit breaker cover. Other internally mounted accessories cannot be installed in the same pole as the cylinder lock. (Factory installation only.)

**Key Interlock Kit (Lock Not Included)**

The key interlock is used to externally lock the circuit breaker handle in the OFF position. When the key interlock is locked, an extended deadbolt blocks movement of the circuit breaker handle. Uniquely coded keys are removable only with the deadbolt extended. Each coded key controls a group of circuit breakers for a given specific customer installation.

The key interlock assembly is Underwriters Laboratories listed for field installation under UL File E7819 and consists of a mounting kit and a purchaser supplied deadbolt lock. The mounting kit comprises a mounting plate, which is secured to the circuit breaker cover in either the left- or right-pole position, key interlock mounting screws, and a wire seal. Specific mounting kits are required for individual key interlock types.

**Sliding Bar Interlock**

The sliding bar interlock provides mechanical interlocking between two adjacent three-pole circuit breakers. It is installed on the enclosure cover between the circuit breakers. When the sliding bar interlock handle is moved from one side to the other, a bar extends to alternately block movement of the circuit breaker handles and prevents both circuit breakers from being switched to ON at the same time. Sliding bar interlocks are not UL listed. (Field installation only.)

**Walking Beam Interlock**

The walking beam Interlock provides mechanical interlocking between two adjacent circuit breakers of the same pole configuration. The walking beam interlock mounts on a bracket behind and between the circuit breakers. A plunger on each end of the beam is inserted through an access hole in the back plate and base of each circuit breaker. The walking beam interlock prevents both circuit breakers from being switched ON at the same time. If a walking beam interlock is installed, the wiring troughs in the back of the circuit breaker case are blocked by the plungers and cannot be used for cross wiring. Factory modified circuit breakers are required for this application. UL File E38116.

**Electrical Operator**

The electrical (solenoid) operator is a single solenoid mechanism that enables local and remote circuit breaker ON, OFF, and reset switching. The electrical operator is mounted on the circuit breaker cover within the trimline of the circuit breaker. The electrical operator uses a unique bi-stable latch that allows the device to operate using one solenoid. The accessory provides high-speed switching with a maximum operating time of 5 cycles (80 mS), making it suitable for generator synchronizing applications.

Means are provided for remote electrical operation and for local manual operation. A special slide includes provisions for padlocking the circuit breaker handle in the OFF position. The slide will accept three padlock shackles with a maximum diameter of 1/4-inch (6.4 mm) each. An interlock electrically disconnects the solenoid when the electrical operator cover is removed. The rating data tables provide electrical rating data for the electrical (solenoid) operator.

The electrical (motor) operator allows the circuit's breaker to be opened, closed or reset remotely. It also has a lock-off capability and provisions for manual operation.

The electrical (motor) operator contains a reversible motor connected to a ball screw. The ball screw drives the circuit breaker handle. Limit switches and relays are used to control the motor.

#### **Plug-In Adapters**

Plug-in adapters simplify installation and front removal of circuit breakers. Individual line and load plug-in adapters are available for rear connection applications on two-, three-, and four-pole circuit breakers. Common mounting plates for line- and load-end adapters are available.

One plug-in adapter kit is required for line-end and one for load-end.

Plug-in adapters are UL approved unless otherwise noted.

#### **Rear Connecting Studs**

Rear connecting studs are available in several sizes to accommodate specific fixed-mounted circuit breaker applications.

Each rear connecting stud assembly consists of one stud and one tube. To maintain proper clearances between poles, select alternate long and short stud assemblies for circuit breakers with more than one pole. One assembly is required for line-end and one for load-end of each pole. Tubes must be ordered separately. Connecting studs are available only with English thread sizes.

**Note:** Not UL listed.

#### **Panelboard Connecting Straps**

Panelboard connecting straps are used to connect the circuit breaker terminals to the panelboard bus. The panelboard connecting straps are available with various ratings for outside and center poles. (Field installation only.)

Panelboard connecting straps are available to meet the needs of most standard panelboard applications. Style numbers for mounting brackets for CDP panelboard installations are also included.

**Note:** Not UL listed. Refer to panelboard manufacturer for compatibility.

#### **ype LFD Current Limiter**

The LFD current limiter is an accessory that bolts to the load end of a standard FDB or FD thermal-magnetic circuit breaker, providing 200,000A interrupting capacity at up to 600 Vac. LFD current limiters for thermal-magnetic and electronic circuit breakers are listed with Underwriters Laboratories under File E47239.

#### **Ground Fault Alarm Unit**

The ground fault alarm unit is a remotely mounted device with a combination indicating light/test button that will light when the breaker trips or alarms on ground fault. The ground fault alarm unit requires a separate 120 Vac power source to power the light and the internal relay, which has 1NO and 1NC contacts for remote indication. The ground fault alarm unit can be panel mounted for ordering with an optional face mounting bracket. For use on Digitrip 310 only, K- through N-Frame.

#### **IQ Energy Sentinel**

The IQ Energy Sentinel is a highly accurate, microprocessor-based, breaker-mounted device designed to monitor power and energy readings. It represents an alternative to watt meters, watt-hour meters, and watt demand meters. Key advantages include savings in space, lower installation costs, and remote monitoring capability.

The IQ Energy Sentinel mounts on the load side of a Series C F-Frame (150 ampere) circuit breaker. It can be applied on three-phase, four-wire systems, or single-phase, three-wire systems with voltage connected through Phases A and C.

For more information, see Descriptive Bulletin 8178.

#### **TPotential Transformer Module**

The potential transformer module is required for the Digitrip OPTIM 1050 to provide a voltage input to allow the trip unit to monitor power and energy as well as power factor. The potential transformer module is a 6 VA transformer with a primary voltage input of up to 600 volt line to line. Three 0.1 ampere fuses are provided on the primary of the transformer and can be used for isolation purposes during dielectric testing. The device is normally panel mounted and can feed up to 16 OPTIM trip units.

#### **Solid-State (Electronic) Portable Test Kit**

The solid-state (electronic) portable test kit provides verification of performance of all ratings of Digitrip 310 electronic trip units installed in circuit breakers while in service under varying load and/or phase imbalance. The test kit operates on 120-volt, 50/60 Hz power; it includes complete instructions and test times for testing long time, short time/instantaneous operation and optional ground fault operation of the circuit breaker.

**Breaker Interface Module (BIM)**

The Breaker Interface Module (BIM) is a panel mounted user interface device that is mounted on the front of an electrical assembly or at a remote location. The BIM is used to access, configure, test and display information for OPTIM trip units and other devices. The BIM consists of four display windows, eight function buttons, 18 LEDs, and a graphical time/current curve to provide breaker status, operational information, protection status and energy monitoring. A 24 Vdc power supply is required to provide power to the BIM. This is supplied by the switchboard builder to Eaton's specifications. The BIM is a member of Eaton's PowerNet family of communicating devices that connects OPTIM trip units, Digitrip RMS 810/910 trip units and energy sentinels as a subnetwork system. The BIM can also be connected to a main network via a PONI module to PowerNet software.

**Digitrip OPTIMizer**

The Digitrip OPTIMizer is a hand-held programmer that is used to access, configure, test and display information from OPTIM trip units. The OPTIMizer plugs into the front of an OPTIM trip unit via an eight-pin telephone jack and is powered by a nine-volt battery or the auxiliary power module. One highlighted feature is the "Copy" and "Download" commands.

Setting up multiple OPTIM trips can be finished in minutes and with no errors. An Auxiliary Power Module connection provides a trip test when control power is not present at the breaker. The OPTIMizer is supplied as a standard package to include the programmer, the eight-pin connection cord, battery and carrying case. The auxiliary power module is optional.

**Auxiliary Power Module**

The auxiliary power module is a power supply requiring 120 Vac input at 50 or 60 Hz that provides a 32 Vdc output. The auxiliary power module provides control power for testing an OPTIM trip unit when other means of control power is not available or for continuous OPTIMizer operation versus temporary with a battery. The auxiliary power module connects into the top of the Digitrip OPTIMizer via a keyed receptacle. The main application for the auxiliary power module would be for the testing of a standalone non-communicating OPTIM breaker that ordinarily would not have control power.

**Cause of Trip Display/Remote Mount Cause of Trip Display**

The Cause of Trip Display can be field-installed on any Digitrip RMS 310+ trip unit. The device provides breaker information through an LCD screen, such as cause of trip, phase current, ground current and low loads. The display is ideal for troubleshooting common trips such as ground fault, long delay, and instantaneous/short delay. The DIGIVIEW version will provide a local display at the breaker without additional wiring by connecting directly onto the trip unit. The DIGIVIEWR06 version has a 6 foot cable that allows users to mount the display on the outside of an enclosure door and connect to the trip unit that is contained inside the enclosure.

**Cause of Trip LED Module**

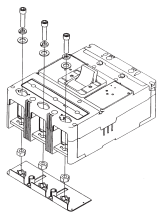
The Cause of Trip LED Module can be field-installed on any Digitrip RMS 310+ trip unit. The device provides a cause of trip indication via LED. The Cause of Trip LED Module connects directly onto the trip unit. When the breaker trips, the module indicates the cause of trip (long delay, short delay, instantaneous and ground) via LED indication. The module is reset after the breaker is reset.

**Note:** The OPTIMizer can work off of 32 Vdc control power, although 24 Vdc is the standard on OPTIM breakers.

**Product Selection**

**Termination Hardware—End Cap Kit**

**End Cap Kit**

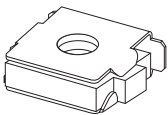


**End Cap Kit**

Thread Type	Thread Size	Catalog Number
<b>Two-Pole F-Frame (225A)</b>		
Imperial	10–32	KPEK12
Metric	M–5	KPEKM12
<b>Three-Pole F-Frame (225A)</b>		
Imperial	10–32	KPEK1
Metric	M–5	KPEKM1
<b>Four-Pole F-Frame (225A)</b>		
Imperial	10–32	KPEK14
Metric	M–5	KPEKM14
<b>Three-Pole J-Frame</b>		
Imperial	0.312–18	KPEK2
Metric	M–8	KPEKM2
<b>Four-Pole J-Frame</b>		
Imperial	0.312–18	KPEK24
Metric	M–8	KPEKM24
<b>Three-Pole K-Frame</b>		
Imperial	0.312–18	KPEK3
Metric	M–8	KPEKM3
<b>Four-Pole K-Frame</b>		
Imperial	0.312–18	KPEK34
Metric	M–8	KPEKM34
<b>Three-Pole L-Frame</b>		
Imperial	0.312–18	KPEK4
Metric	M–8	KPEKM4
<b>Four-Pole L-Frame</b>		
Imperial	0.312–18	KPEK44
Metric	M–8	KPEKM44

**Termination Hardware—Keeper Nut**

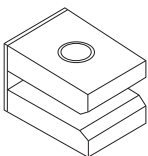
**F-Frame Keeper Nut**



**F-Frame Keeper Nut**

Thread Type	Thread Size	Catalog Number Package of 12 (Priced Individually)
Imperial	10–32	KPR1A
Metric	M–5	KPR1AM

**K-Frame Keeper Nut**



**K-Frame Keeper Nut**

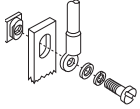
Thread Type	Thread Size	Line/Load End	Catalog Number Package of 3
Imperial	0.375–16	Line	KPR3A
		Load	KPR3B
Metric	M–8	Line	KPR3AM
		Load	KPR3BM

**Note**

L-, M-, N-Frames not required. Terminals are threaded.

#### Termination Hardware

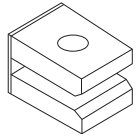
##### J-Frame Plug Nut



##### J-Frame Plug Nut

Thread Type	Thread Size	Catalog Number Package of 6
Imperial	0.250–20	PLN2
Metric	M–6	PLN2M

##### K-Frame Terminal Adapter



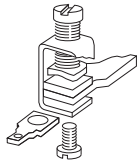
##### K-Frame Terminal Adapter <sup>①</sup>

Line/Load End	Catalog Number
Line and load	TAD3

#### F-Frame Ordering Information

Terminals must be ordered separately. Priced individually.

##### F-Frame Kit



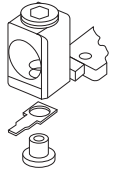
##### F-Frame Control Wire Terminal Kit <sup>②</sup>

Description	Maximum Amperes	Catalog Number
Package of 12 control wire terminal tangs.	150	FCWTK
	225	FCWTK225

#### J- and K-Frame Ordering Information

Terminals must be ordered separately. Priced individually.

##### J- and K-Frame Kit



##### J- and K-Frame Control Wire Terminal Kit

Description	Catalog Number
Package of 12 control wire terminal tangs.	KCWTK

##### L-Frame Control Wire Terminal Kit

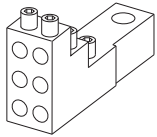
AWG Wire Range/Number Conductors	Metric Wire Range mm <sup>2</sup>	Catalog Number
Al/Cu 3/0–350 kcmil (2)	95–150	TA602LDCW <sup>③</sup>
Cu 250–350 kcmil (2)	120–250	T602LDCW <sup>③</sup>
Al/Cu 400–500 kcmil (2)	185–240	2TA603LDKCW <sup>④⑤</sup>
Al/Cu 400–500 kcmil (2)	185–240	3TA603LDKCW <sup>④⑥</sup>
Al/Cu 400–500 kcmil (2)	185–240	4TA603LDKCW <sup>④⑦</sup>

#### Notes

- ① K-Frame terminal adapter for use in replacing LB/DA breakers.
- ② Not for use with T250KB terminals.
- ③ Individually packed.
- ④ Terminal kits contain one terminal for each pole and one terminal cover.
- ⑤ Two-pole kit.
- ⑥ Three-pole kit.
- ⑦ Four-pole kit.

**Termination Hardware****G-Frame Control Wire Terminal**

Description	Catalog Number	Catalog Number
Control wire terminal (kit of 12)	5652B38G01	GCWTK

**Multiwire Connectors****Multiwire Connectors Ordering Information (Package of 3)**

Maximum Amperes	Wires per Terminal	Wire Size Range AWG Cu	Kit Catalog Number
<b>G-Frame</b> <sup>①</sup>			
100	3	14-2	3TA100G3K
	6	14-6	3TA100G6K
<b>F-Frame</b>			
225	3	14-2	3TA150F3K
	6	14-6	3TA150F6K
<b>J-Frame</b>			
250	3	14-2	3TA250J3K
	6	14-6	3TA250J6K
<b>K-Frame</b>			
400	3	14-2/0	3TA400K3K
	6	14-3	3TA400K6K

**Base Mounting Hardware****Ordering Information**

Hardware for surface mounting of circuit breakers is supplied only on request. Hardware consists of mounting screws and lockwashers. Order hardware for circuit breaker pole configurations as required.

**Mounting Hardware**

Screw Length in Inches (mm)	Catalog Number
<b>G-Frame</b>	
0.138-32 x 2.63 (3.5 x 66.7 mm) Std.	624B375G23
0.138-32 x 3.00 (3.5 x 76.2 mm)	8703C80G05

**Note**

<sup>①</sup> GD breakers require special tapping for multiwire lugs, as described in the IL or use with standard aluminum collars.



## Imperial Thread Mounting Hardware

Number of Poles	Description	Type of Mounting	Catalog Number
<b>F-Frame</b>			
1	0.164-32 x 3.188-inch pan-head steel screws, lockwashers and clamps	Individual	<b>624B375G01</b>
		Group ①	<b>624B375G02</b>
2	0.164-32 x 1.5-inch pan-head steel screws and lockwashers	Individual	<b>4218B80G01</b>
3, 4	0.164-32 x 1.5-inch pan-head steel screws and lockwashers	Individual	<b>BMH1</b>
<b>J-Frame</b>			
2, 3, 4	0.250-20 x 2.75 inch pan-head steel screws and lockwashers	Individual	<b>BMH2</b>
<b>K-Frame</b>			
2, 3, 4	0.250-20 x 1.5 inch pan-head steel screws and lockwashers	Individual	<b>BMH3</b>
<b>L-Frame</b>			
2, 3, 4	0.250-20 x 1.5 inch filister-head steel screws and lockwashers and flat washers	Individual	<b>BMH4</b>
<b>M-Frame</b>			
2, 3	0.3125-18 x 1.25 inch filister-head steel screws and lockwashers and flat washers	Individual	<b>BMH5</b>
<b>N-Frame</b>			
2, 3, 4	0.3125-18 x 1.25 inch pan-head steel screws and lockwashers	Individual	<b>BMH5</b>
<b>R-Frame</b>			
Supplied by customer			

## Metric Thread Mounting Hardware

Number of Poles	Description	Type of Mounting	Catalog Number
<b>F-Frame</b>			
1	M4-0.7 x 80 mm pan-head steel screws, lockwashers, and clamps	Individual	<b>4218B80G09</b>
		Group ①	<b>4218B80G10</b>
2	M4-0.7 x 38 mm pan-head steel screws and lockwashers	Individual	<b>4218B80G11</b>
3, 4	M4-0.7 x 38 mm pan-head steel screws and lockwashers	Individual	<b>BMH1M</b>
<b>J-Frame</b>			
2, 3, 4	M6-0.7 x 70 mm pan-head steel screws and lockwashers	Individual	<b>BMH2M</b>
<b>K-Frame</b>			
2, 3, 4	M6-0.7 x 38 mm pan-head steel screws and lockwashers	Individual	<b>BMH3M</b>
<b>L-Frame</b>			
2, 3	—	Individual	<b>BMH4M</b>
<b>M-Frame</b>			
2, 3	—	Individual	<b>BMH5M</b>
<b>N-Frame</b>			
2, 3	—	Individual	<b>BMH5M</b>
<b>R-Frame</b>			
Supplied by customer			

**Note**

① One set of hardware for two circuit breakers.

**Terminal Shields**

**G-Frame Terminal Shield**

Number Units in Package	Catalog Number
10	GTSK3

**F-Frame**



**F-Frame Terminal Shield**

Number of Poles	Location	Standard (Package of 10) (Priced Individually)	Special—For Use When Electrical Operator is Mounted on Circuit Breaker
		Catalog Number	Catalog Number
1	Line	625B229G06	—
2	Line	625B229G07	—
3	Line	625B229G08	4210B95G01
4	Line	625B229G09	4210B95G02

**J-Frame**



**J-Frame Terminal Shield**

Number of Poles	Location	Catalog Number (Package of 10)
2, 3	Line End	1266C07G01
4	Line End	6631C01G01
2, 3	Load End	6641C16G01
4	Load End	6641C16G02

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## Molded Case Circuit Breakers

### Series C

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#### K-Frame



#### K-Frame Terminal Shield

Number of Poles	Location	Catalog Number (Package of 10)
2, 3	Line	TS33LN
4	Line	TS34LN
3	Load	TS33LD

#### L-Frame Terminal Shield

Catalog Number (Package of 1)  
**314C420G05**

#### M-Frame Terminal Shield

Catalog Number (Package of 1)  
**208B966G01**

#### N-Frame Terminal Shield

Catalog Number (Package of 1)  
**NTS3K**

#### Terminal End Covers

##### Ordering Information

The terminal end cover is available for three-pole circuit breakers only. Two conductor opening sizes are available. Specify quantity (one per circuit breaker) when ordering.

#### F-Frame



#### F-Frame Terminal End Covers

Conductor Opening Diameter in Inches (mm)	Catalog Number
0.25 (6.35 mm)	TEC1
0.41 (10.41 mm)	TEC2

#### Interphase Barriers

##### Ordering Information

Two per package.

#### Interphase Barrier



#### Interphase Barriers

Frame	Catalog Number
F	IPB1
J, K	IPB3
L	IPB4
M	IPB4
N	IPB5

#### Base Mounting Plate

##### Base Mounting Plate



#### Base Mounting Plate G-Frame GD/GHC

Number of Units in Package	Catalog Number
1	207B513G01

#### DIN Rail Adapter

##### DIN Rail Adapter

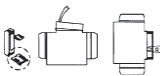


#### DIN Rail Adapter G-Frame GD/GHC

Number of Poles	Number of Units in Package	Catalog Number
1, 2	10	1225C79G01
3	10	1225C79G02 <sup>①</sup>

#### Key Operated Attachment

##### Key Operated Attachment



#### Key Operated Attachment G-Frame GD/GHC

Number of Units in Package	Catalog Number
10	GK0A

#### Lock Dog (Non-Padlockable)

##### Lock Dog (Non-Padlockable)



#### Lock Dog (Non-Padlockable) G-Frame GD/GHC/GHB/GMCP

Number of Units in Package	Catalog Number
1	1294C01H01

##### Note

<sup>①</sup> For use on three-pole breakers only.

**Non-Padlockable Handle Block**

**Non-Padlockable Handle Block**



**Non-Padlockable Handle Block**

Frame	Catalog Number
F	LKD1
J, K	LKD3
L, M, N	LKD4

**Padlockable Handle**

**Padlockable Handle**



**Padlockable G-Frame GD/GHC/GHB**

Number of Units in Package	Catalog Number <sup>①</sup>
10	1223C77G03
10	1223C77G05 <sup>②</sup>
10	1223C77G06 <sup>②</sup>

**Padlockable Handle Lock**

**Padlockable Handle Lock**



**Padlockable Handle Lock**

Frame	Catalog Number
G	GPHBOFF
J, K	PHB3

**Snap-On Padlockable Handle Lock Hasp**

**Snap-On Padlockable Handle Lock Hasp**



**Snap-On Padlockable Handle Lock Hasp**

Frame	Catalog Number
F	PHL1

**Notes**

- ① Accepts 0.285 Lock Shank.
- ② Padlockable in the OFF position only.

#### Padlockable Handle Lock Hasp

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#### Padlockable Handle Lock Hasp



#### Padlockable Handle Lock Hasp

Description	Catalog Number
<b>F-Frame</b>	
Single-pole breakers	PHL1
Two-, three- and four-pole breakers	PLK1
For left side mounting	PLK1LOFF
For right side mounting	PLK1ROFF
<b>J, K-Frames</b>	
Two-, three- and four-pole breakers	PLK3
For left side mounting	PLK3LOFF ①
For right side mounting	PLK3ROFF ①
<b>L-Frame (Side Mounted)</b>	
Lock ON or OFF	HLK4
Lock OFF only (left-hand mount)	HLK4LOFF ①
<b>L-Frame (Top Mounted)</b>	
Lock ON or OFF	HLK4S
Lock OFF only	HLK4SOFF ①
<b>M-Frame</b>	
Lock ON or OFF	HLK4
Lock OFF only (left-hand mount)	HLK4LOFF ①
<b>M-Frame (Vertical Mounting)</b>	
Lock ON/OFF	HLK4S
Lock OFF only	HLK4SOFF
<b>N-Frame</b>	
Side mounted	PLK5
Top mounted (ON/OFF)	PLK5S
Top mounted (OFF only)	PLK5SOFF ①
<b>R-Frame</b>	
Lock ON/OFF	HLK6
Lock OFF only	HLK6OFF ①

#### Cylinder Lock

#### Cylinder Lock



#### Cylinder Lock

Frame	Catalog Number
F, J, K	Order by description

#### Note

① For padlockable handle lock hasp to padlock handle in OFF position only, order either catalog number.

**Key Interlock Kit****Ordering Information**

Key interlock mounting kits are for field installation only. Select mounting kit catalog numbers to match type of lock used. Key interlocks are supplied by customer.

**Key Interlock Kit****Key Interlock Kit**

Lock Manufacturer	Lock Type	Bolt Projection in Withdrawn Position in Inches (mm)	Kit Catalog Number
<b>F-Frame</b>			
Superior	B-4003-1	0.38 (9.5)	<b>KYK1</b>
Kirk®	F	0.38 (9.5)	<b>KYK1</b>
Square D®	SF	None	<b>KYK1</b>
Castell ①	K or QK	0.38 (9.5)	<b>CTK1</b>
<b>J, K-Frames</b>			
Superior	B-4003-1	0.38 (9.5)	<b>KYK3</b>
Kirk	F	0.38 (9.5)	<b>KYK3</b>
Square D	SF	None	<b>KYK3</b>
Castell ①	K or QK	0.38 (9.5)	<b>CTK3</b>
<b>L-, M-, N-Frames</b>			
Superior	B-4003-1	0.38 (9.5)	<b>KYK4</b>
Kirk	F	0.38 (9.5)	<b>KYK4</b>
Square D	SF	None	<b>KYK4</b>
Castell ①	K or QK	0.38 (9.5)	<b>CTK4</b>
<b>R-Frame</b>			
Superior	B-4003-1	1.0 (25.4)	<b>KYK6</b>
Kirk	F	1.0 (25.4)	<b>KYK6</b>
Square D	SF	1.0 (25.4)	<b>KYK6</b>
Castell ①	K or QK	1.0 (25.4)	<b>CTK6</b>
<b>JG-Frame</b>			
Superior	B-4003-1	0.38 (9.5)	<b>KYKJG</b>
Kirk	F	0.38 (9.5)	<b>KYKJG</b>
Square D	SF	None	<b>KYKJG</b>
Castell ①	K or QK	0.38 (9.5)	<b>CTKJG</b>
<b>LG-Frame</b>			
Superior	B-4003-1	0.38 (9.5)	<b>KYKLG</b>
Kirk	F	0.38 (9.5)	<b>KYKLG</b>
Square D	SF	None	<b>KYKLG</b>
Castell ①	K or QK	0.38 (9.5)	<b>CTKLG</b>

**Note**

① When ordering Castell Interlock, it is necessary for customer to specify that the mounting bolt holes must be 10 mm in diameter

#### Sliding Bar Interlock

##### Ordering Information

The sliding bar interlock is available for mounting between two adjacent three-pole circuit breakers with circuit breakers centerline

spacing as indicated in table and enclosure front panel thickness of 1/8 or 3/16 inch (3.2 or 4.8 mm). (For field installation only.)

#### Sliding Bar Interlock



#### Sliding Bar Interlock

Frame	Centerline Spacing in Inches (mm)	Catalog Number
F	4.19 (106.4)	<b>SBK1</b>
J	4.38 (111.3)	<b>SBK2</b>
K	5.75 (146.0)	<b>SBK3</b>
L, M	8.50 (215.9)	<b>SBK4</b>
N	8.50 (215.9)	<b>SBK5</b>

#### Walking Beam Interlock

##### Ordering Information

The walking beam interlock is available for mounting between two adjacent circuit breakers spaced 1/4-inch (6.4 mm) apart and having the same pole configuration. The two circuit breakers must be factory modified to accept the walking beam interlock assembly (suitable for use with either two-, three- or four-pole circuit breakers).

With properly modified circuit breakers, the walking beam interlock is suitable for field installation. Order circuit breakers specifying modification for walking beam (20% price adder) and select walking beam interlock from table below. Circuit breakers and walking beam interlock are boxed and shipped separately.

#### Walking Beam Interlock



#### Walking Beam Interlock

Frame	Catalog Number
F	<b>WBL1</b>
K	<b>WBL3</b>
L, M	<b>WBL4A</b>
N	<b>WBL5</b>
R ①	<b>WBL6</b>

##### Note

① Three-pole only.

**Electrical Operator****F-Frame Electrical (Solenoid) Operator**

Voltage	Frequency	Terminal Block	18-Inch (457.2 mm) Pigtail Lead
		Catalog Number	Catalog Number
120	AC	EOP1T07	EOP1P07
240	AC	EOP1T11	EOP1P11

**F-Frame Electrical (Motor) Operator** <sup>①</sup>

Voltage	Frequency	18-Inch (457.2 mm) Pigtail Lead
		Catalog Number
120	50/60 Hz AC	MOPFD120C
24	DC	MOPFD24D
125	DC	MOPFD120C
208–240	50/60 Hz	MOPFD240C
220–250	DC	MOPFD240C

**J-Frame Electrical (Solenoid) Operator**

Operating Voltage	Frequency	Terminal Block
		Catalog Number
120	50/60 Hz AC	EOP2T07
240	50/60 Hz AC	EOP2T11

**K-Frame Electrical (Solenoid) Operator**

Operating Voltage	Frequency	Terminal Block
		Catalog Number
120	50/60 Hz AC	EOP3MT07
240	50/60 Hz AC	EOP3MT11

**K-Frame Electrical (Solenoid) Operator Base Mounting Kit**

Frame	Catalog Number
K	BBMK3

**L- and M-Frame Electrical (Motor) Operator (310 and OPTIM)**

Operating Voltage	Frequency	Terminal Block
		Catalog Number
120	50/60 Hz	EOP4MT07
208	50/60 Hz	EOP4MT11
240	50/60 Hz	EOP4MT11A
480	50/60 Hz	EOP4MT15
125	DC	EOP4MT26
24	DC	EOP4MT21

**Note**

① Motor operators MOP1P07, MOP1P03DC, MOP1P05DC and MOP1P07DC are replaced by MOPFD motor operators listed in table.



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## Molded Case Circuit Breakers

### Series C

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#### N-Frame Electrical (Motor) Operator

Operating Voltage	Frequency	Pigtail Leads Catalog Number
120	50/60 Hz	EOP5T07
208	50/60 Hz	EOP5T09
240	50/60 Hz	EOP5T11
480	50/60 Hz	EOP5T15
24	DC	EOP5T21
48	DC	EOP5T22
125	DC	EOP5T26

#### R-Frame Electrical (Motor) Operator

Operating Voltage	Frequency	Factory-Installed Terminal Block Catalog Number
120	50/60 Hz	EOP6T08K
240	50/60 Hz	EOP6T11K
48	DC	EOP6T21K

#### Plug-In Adapters

##### F-Frame Ordering Information (Flat Bar Type)

Continuous Current Rating (Amperes)	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
100–225	1480D13G01	1480D13G02	1480D13G07 <sup>①</sup>
Mounting plate	176C511H01	507C047H01	—

##### J-Frame Ordering Information (Flat Bar Type)

Continuous Current Rating (Amperes)	Terminal End	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
250	Line	1260C86G05	1260C86G06	1231C67G01
	Load	1260C86G07	1260C86G08	1231C67G02
	One line and one load	506C144G27	506C144G28	—
Mounting plate	—	<sup>②</sup>	PMP23	—

##### K-Frame Ordering Information (Flat Bar Type)—600 Vac Maximum

Continuous Current Rating (Amperes)	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
400	PAD32	PAD33	—
Mounting plate	<sup>②</sup>	PMP33	—

#### Notes

- <sup>①</sup> 100 ampere maximum.
- <sup>②</sup> Use three-pole mounting plate for two-pole circuit breaker.

**L-Frame (Threaded Stud Type)**

Continuous Current Rating (Amperes)	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
600 (threaded stud type)	506C059G03	506C059G04	PAD44
600 (flat bar type)	1288C19G01	1288C19G02	6636C55H01
Mounting plate	504C824H01	504C824H01	—

**M-Frame (Flat Bar Type)—600 Vac Maximum**

Continuous Current Rating (Amperes)	Two-Pole Catalog Number	Three-Pole Catalog Number
800	2614D53G05	2614D53G06
Mounting plate	1290C73H01	1290C73H01

**N-Frame (Flat Bar Type)**

Continuous Current Rating (Amperes)	Two-Pole Catalog Number	Three-Pole Catalog Number
1200	2614D53G03	2614D53G04
Mounting plate	1290C73H01	1290C73H01

**Plug-In Adapters**

Frame	Number of Poles	Standard Certification	Catalog Number
FD	3	IEC	PAD3F
FD	4	IEC	PAD4F
JD	3	IEC	PAD3JD
KD	3	IEC	PAD3K
LD	3	IEC	PAD3LD
LD	4	IEC	PAD4LD

**Rear Connecting Studs****F-Frame** ①

Stud Ampere Rating	Stud Catalog Number	Tube Catalog Number
<b>For 15 to 100 Ampere Circuit Breakers</b>		
100A short	451D874G01	32B9446H20
100A short	451D874G01	32B9446H21
100A short	451D874G01	32B9446H22
100A short	451D874G01	32B9446H23
100A long	451D874G02	32B9446H24
100A long	451D874G02	32B9446H25
100A long	451D874G02	32B9446H26
100A long	451D874G02	32B9446H27
<b>For 110 to 225 Ampere Circuit Breakers</b>		
225A short	374D883G01	374D883H06
225A short	374D883G01	374D883H07
225A short	374D883G01	374D883H08
225A short	374D883G01	374D883H09
225A long	374D883G02	374D883H10
225A long	374D883G02	374D883H11
225A long	374D883G02	374D883H12
225A long	374D883G02	374D883H13

**J-Frame** ①

Stud Ampere Rating	Stud Catalog Number	Tube Catalog Number
250A short	5010D23G01	456D983H05
250A short	5010D23G01	456D983H06
250A short	5010D23G01	456D983H07
250A long	5010D23G02	5010D23H05
250A long	5010D23G02	5010D23H06
250A long	5010D23G02	5010D23H07

**K-Frame** ①

Stud Ampere Rating	Stud Catalog Number	Standard Tube Catalog Number
400A short	6642C14G02	313C909H17
400A short	6642C14G04	313C909H18
400A short	6642C14G06	313C909H19
400A long	6642C14G03	313C909H20
400A long	6642C14G05	313C909H21
400A long	6642C14G07	313C909H22

**L-Frame Ordering Information**

Stud Catalog Number
314C960G07
314C960G08
314C960G09

**M-Frame Ordering Information** ①

Stud Ampere Rating	Stud Catalog Number
225	314C960G01
400	314C960G04
400	314C960G05
400	314C960G06
600	314C960G07
600	314C960G08
600	314C960G09
800	314C960G10
800	314C960G11
800	314C960G12

**N-Frame Ordering Information** ①

Stud Ampere Rating	Stud Catalog Number
800	623B222G01
800	623B222G02
800	623B222G03
1200	373B375G04
1200	373B375G03

**Note**

① Not UL listed.

**Panelboard Connecting Straps****F-Frame Panelboard Connecting Straps**

Bus Spacing in Inches (mm)	Continuous Current Rating (Amperes)	Pole Connector Type	
		Center Catalog Number	Outside Catalog Number
2.75 (69.9)	50	673B142G02	673B142G09
2.75 (69.9)	100	673B142G02	673B142G10
2.75 (69.9)	150	673B142G04	673B142G03
3.50 (88.9)	50	1253C72G01	1253C72G03
3.50 (88.9)	100	1253C73G03	1253C73G06
3.50 (88.9)	150	1253C73G01	1253C73G05

**F-Frame Mounting Bracket**

Number of Poles	Catalog Number
2	624B600H02
3	624B600H01

**J-Frame Panelboard Connecting Straps**

Bus Spacing in Inches (mm)	Continuous Current Rating (Amperes)	Pole Connector Type	
		Center Catalog Number	Outside Catalog Number
3.50 (88.9)	250	2600D26G01	2600D26G02

**K-Frame Panelboard Connecting Straps**

Bus Spacing in Inches (mm)	Continuous Current Rating (Amperes)	Pole Connector Type	
		Center Catalog Number	Outside Catalog Number
3.50 (88.9)	400	4212B78G02	4212B77G01

**K-Frame Mounting Bracket**

Number of Poles	Catalog Number
2, 3	208B264H01

**L-Frame Panelboard Connecting Straps**

Continuous Current Rating (Amperes)	Pole Connector Type	
	Center	Outside
	Catalog Number	Catalog Number
600	624B609G01	506C052G01

**L-Frame Mounting Bracket**

Number of Poles	Catalog Number
2, 3	208B297H01

**M-Frame Panelboard Connecting Straps**

Bus Spacing in Inches (mm)	Continuous Current Rating (Amperes)	Pole Connector Type	
		Connector Type	Catalog Number
3.50 (88.9)	800	Short	314C996G01
		Medium	314C996G02
		Long	314C996G03

**M-Frame Mounting Bracket**

Catalog Number
315C270H01

**N-Frame Panelboard Connecting Straps**

Bus Spacing in Inches (mm)	Continuous Current Rating (Amperes)	Pole Connector Type	
		Connector Type	Catalog Number
3.50 (88.9)	1200	Short	505C606G04
		Medium	505C606G05
		Long	505C606G06

**N-Frame Mounting Bracket (Four Required)**

Catalog Number
315C270H01

**Type LFD Current Limiter**

The LFD current limiter is an accessory that bolts to the load end of a standard FDB or FD thermal-magnetic and electronic circuit breaker, providing 200,000A

interrupting capacity at up to 600 Vac. LFD current limiters for thermal-magnetic circuit breakers are listed with Underwriters Laboratories under File E47239.

**Type LFD Current Limiter**



**Type LFD Current Limiter**

Circuit Breaker Rating Amperes	Catalog Number
15-70	LFD3070R
80-160	LFD3150R

**Ground Fault Alarm Unit**

The ground fault alarm unit is a remotely mounted device with a combination indicating light/test button that will light when the breaker trips or alarms on ground fault. The ground fault alarm unit requires a separate 120 Vac power source to power the

light and the internal relay, which has 1NO and 1NC contacts for remote indication. The ground fault alarm unit can be panel mounted for ordering with an optional face mounting bracket. For use on Digitrip 310 only, K- through N-Frame.

**Ground Fault Alarm Unit**



**GF Alarm Unit**

Description	Catalog Number
Ground fault alarm unit	GFAU
Face mounting bracket	1264C67G01

**IQ Energy Sentinel**

The IQ Energy Sentinel is a highly accurate, microprocessor-based, breaker-mounted device designed to monitor power and energy readings. It represents an alternative to watt meters, watt-hour meters, and watt demand meters. Key advantages include savings in space, lower installation costs, and remote monitoring capability.

The IQ Energy Sentinel mounts on the load side of a Series C F-Frame (150 ampere) circuit breaker. It can be applied on three-phase, four-wire systems, or single-phase, three-wire systems with voltage connected through Phases A and C.

For more information, see Descriptive Bulletin 8178.

**Potential Transformer Module**

The potential transformer module is required for the Digitrip OPTIM 1050 to provide a voltage input to allow the trip unit to monitor power and energy as well as power factor. The potential transformer module is a 6 VA transformer with a primary voltage input of up to 600 volt

line to line. Three 0.1 ampere fuses are provided on the primary of the transformer and can be used for isolation purposes during dielectric testing. The device is normally panel mounted and can feed up to 16 OPTIM trip units.

**Potential Transformer Module**



**Potential Transformer Module**

Description	Catalog Number
Potential transformer module	DOPTMLN

**Solid-State (Electronic) Portable Test Kit**

The solid-state (electronic) portable test kit provides verification of performance of all ratings of Digitrip 310 electronic trip units installed in circuit breakers while in service under varying load and/or phase imbalance. The test kit operates on 120-volt,

50/60 Hz power; it includes complete instructions and test times for testing long time, short time/instantaneous operation and optional ground fault operation of the circuit breaker.

**Portable Test Kit**

Description	Catalog Number
Solid-state (electronic) portable test kit	STK2

#### Breaker Interface Module (BIM)

The Breaker Interface Module (BIM) is a panel mounted user interface device that is mounted on the front of an electrical assembly or at a remote location. The BIM is used to access, configure, test and display information for OPTIM trip units and other devices. The BIM consists of four display windows, eight function buttons, 18 LEDs, and a graphical time/current curve to provide breaker status, operational information, protection status and energy monitoring. A 24

Vdc power supply is required to provide power to the BIM. This is supplied by the switchboard builder to Eaton's specifications. The BIM is a member of Eaton's PowerNet family of communicating devices that connects OPTIM trip units, Digitrip RMS 810/910 trip units and energy sentinels as a subnetwork system. The BIM can also be connected to a main network via a PON1 module to PowerNet software.

#### Breaker Interface Module (BIM)



#### Breaker Interface Module (BIM)

Catalog Number

BIMII

#### Digitrip OPTIMizer

The Digitrip OPTIMizer is a hand-held programmer that is used to access, configure, test and display information from OPTIM trip units. The OPTIMizer plugs into the front of an OPTIM trip unit via an eight-pin telephone jack and is powered by a nine-volt battery or the auxiliary power module. One highlighted feature is the "Copy" and "Download" commands.

Setting up multiple OPTIM trips can be finished in minutes and with no errors. An Auxiliary Power Module connection provides a trip test when control power is not present at the breaker. The OPTIMizer is supplied as a standard package to include

the programmer, the eight-pin connection cord, battery and carrying case. The auxiliary power module is optional.

#### Note: 24 Vdc Power Supply

A 24 Vdc power supply is required for all Digitrip OPTIM trip units that are required to communicate either on the main Eaton PowerNet network or as a subnetwork to a BIM. The breaker's load is 45 mA of current. Typically one power supply is required per switchboard and can provide control power to a BIM and the OPTIM trip units. The 24 Vdc power supply should be an "isolated high quality" power supply with a "CE" label, and is normally provided by the switchboard manufacturer to Eaton's recommendations.

#### Digitrip OPTIMizer



#### Digitrip OPTIMizer

Catalog Number

OPTIMizer—standard package

#### Auxiliary Power Module

The auxiliary power module is a power supply requiring 120 Vac input at 50 or 60 Hz that provides a 32 Vdc output. The auxiliary power module provides control power for testing an OPTIM trip unit when other means of control power is not available or for continuous OPTIMizer operation versus temporary with a battery. The auxiliary

power module connects into the top of the Digitrip OPTIMizer via a keyed receptacle. The main application for the auxiliary power module would be for the testing of a standalone non-communicating OPTIM breaker that ordinarily would not have control power.

#### Auxiliary Power Module



#### Auxiliary Power Module

Catalog Number

PRTBAPMDV

#### Cause of Trip Display/Remote Mount Cause of Trip Display

The Cause of Trip Display can be field-installed on any Digitrip RMS 310+ trip unit. The device provides breaker information through an LCD screen, such as cause of trip, phrase current, ground current and low loads. The display is ideal for troubleshooting common trips such as ground fault, long delay, and instantaneous/short delay.

The DIGIVIEW version will provide a local display at the breaker without additional wiring by connecting directly onto the trip unit. The DIGIVIEWR06 version has a 6 foot cable that allows users to mount the display on the outside of an enclosure door and connect to the trip unit that is contained inside the enclosure.

#### Cause of Trip Display/Remote Mount Cause of Trip Display

Catalog Number

DIGIVIEW

DIGIVIEWR06

#### Cause of Trip LED Module

The Cause of Trip LED Module can be field-installed on any Digitrip RMS 310+ trip unit. The device provides a cause of trip indication via LED. The Cause of Trip LED Module connects directly onto the trip unit. When the

breaker trips, the module indicates the cause of trip (long delay, short delay, instantaneous and ground) via LED indication. The module is reset after the breaker is reset.

#### Cause of Trip LED Module

Catalog Number

TRIP-LED

## Accessories

### Flex Shaft Accessories (F- through R-Frame)

#### NEMA 12 Safety Door Hardware for Flex Shaft and C371 <sup>①</sup>

Handle Length in Inches (mm)	Catalog Number <sup>②</sup>
4 (101.6)	C361KJ4
6 (152.4)	C361KJ6
Roller Latch <sup>③</sup>	C361KR

#### Series C Rotary Accessories

As an option, an auxiliary switch is offered so that the control panel builder may electrically indicate the status of the breaker.

This accessory would be mounted on the mechanism and comes with 24-inch (609.6 mm) pigtail leads.

#### Series C Auxiliary Switch

Catalog  
Number

5108A61G01

#### Notes

- ① Customer: Consult with box manufacturer for correct door hardware and any adapters required for assembly.
- ② The 1/4-inch x 1/2-inch (6.35 x 12.7 mm) standard mill rectangular locking bar is not supplied with these kits.
- ③ Third roller latch for use with 4- or 6-inch (101.6 or 152.4 mm) handle when 3 point latching is required.



### Technical Data and Specifications

#### Electrical Operator

##### F-Frame Electrical (Solenoid) Operator Rating Data <sup>①②</sup>

Voltage <sup>③</sup>	Frequency	Inrush Current Amperes	Maximum Operating Time	Fuse Amperes <sup>④</sup>
120	50/60 Hz AC	10	5 cycles (80 ms)	3
240	50/60 Hz AC	5	5 cycles (80 ms)	2

##### F-Frame Electrical (Motor) Operator Rating Data <sup>②⑤⑥⑦</sup>

Voltage <sup>③</sup>	Frequency	Inrush Current Amperes
120	AC	2
24	DC	5
48	DC	3
125	DC	2

##### J-Frame Electrical (Solenoid) Operator Rating Data <sup>①⑥⑧⑨</sup>

Voltage <sup>③</sup>	Inrush Current Amperes	Fuse Amperes
120	30	6
240	16	4

##### K-Frame Electrical (Solenoid) Operator Rating Data <sup>①⑥⑧⑨</sup>

Operating Voltage <sup>③</sup>	Inrush Current Amperes	Fuse Amperes
120	30	6
240	16	4

##### L- and M-Frame Electrical (Motor) Operator Rating Data <sup>①⑥⑧⑩</sup>

Operating Voltage <sup>③</sup>	Inrush Current Amperes
120 AC	31
208 AC	13
240 AC	12
125 DC	21
24 DC	50

##### N-Frame Electrical (Motor) Operator Rating Data <sup>①⑥⑩⑫</sup>

Operating Voltage <sup>③</sup>	Frequency	Inrush Current Amperes	Fuse Amperes
120	50/60 Hz	31	6
208	50/60 Hz	21	—
240	50/60 Hz	19	4
480	50/60 Hz	—	—
24	DC	50	—
48	DC	80	—
125	DC	21	—

##### R-Frame Electrical (Motor) Operator Rating Data <sup>③⑭⑮⑯</sup>

Operating Voltage <sup>⑦</sup>	Frequency	Motor Inrush Current Amperes
120	50/60 Hz	40
240	50/60 Hz	27
48	DC	53
24	DC	58

#### Notes

- ① UL listed under UL File E64983.
  - ② The electrical operator design is endurance tested for 8000 electrical operations.
  - ③ Tolerance: +10%, -15% of nominal voltage.
  - ④ Use current-limiting type fuse where required.
  - ⑤ UL listed under UL File E64124.
  - ⑥ Frequency: 50/60 Hz.
  - ⑦ Maximum operating time: 3 seconds max. Operator is an intermittent duty device. The safe duty cycle (OFF to ON to OFF) should not exceed one per minute.
  - ⑧ The electrical operator design has been endurance tested for 6000 electrical operations.
  - ⑨ Maximum operating time: 5 cycles (80 mS).
  - ⑩ Maximum operating time: 12 cycles.
  - ⑪ The electrical operator design has been endurance tested for 2,500 electrical operations.
  - ⑫ Maximum operating time: 12 cycles max. Operator is an intermittent duty device. The safe duty cycle (OFF to ON to OFF) should not exceed one per minute.
  - ⑬ Operator is an intermittent duty service. The safe duty cycle (OFF to ON to OFF) should not exceed one per minute.
  - ⑭ Electric Operating time at rated voltage; (a) To turn breaker ON—1/2 second max. (b) To turn breaker OFF—1/2 second max.
  - ⑮ Motor operating temperature; Class "A" temperature limits apply.
  - ⑯ A minimum 1 kVA power source is recommended for motor operation.
  - ⑰ Applied voltage should be no less than 85% or no more than 110% of rated voltage.
- For OPTIM trip, OPEOPCK kit required.

**Dimensions**

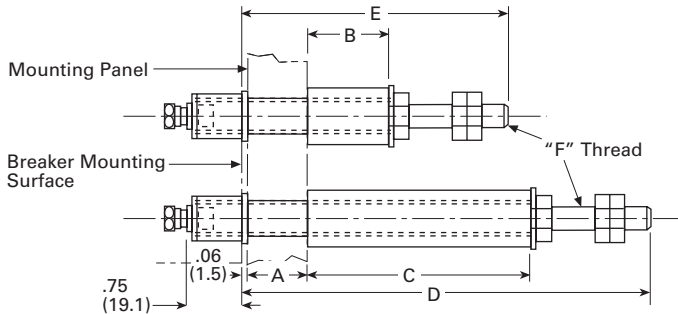
Approximate Dimensions in Inches (mm)

**Rear Connecting Studs**

**F-Frame** ①

Stud Ampere Rating	Stud Catalog Number	Panel Thickness		Tube Length		Tube Catalog Number	Dimensions		
		A		B	C		D	E	F
<b>For 15 to 100 Ampere Circuit Breakers</b>									
100A short	451D874G01	1.00 (25.4)		1.06 (26.9)	—	32B9446H20	—	3.63 (92.1)	0.31 (7.9)–18
100A short	451D874G01	0.69–0.94 (17.5 to 23.8)		1.38 (34.9)	—	32B9446H21	—	3.63 (92.1)	0.31 (7.9)–18
100A short	451D874G01	0.38–0.63 (9.5 to 15.9)		1.69 (42.9)	—	32B9446H22	—	3.63 (92.1)	0.31 (7.9)–18
100A short	451D874G01	0.25–0.31 (6.4 to 7.9)		2.00 (50.8)	—	32B9446H23	—	3.63 (92.1)	0.31 (7.9)–18
100A long	451D874G02	1.00 (25.4)		—	3.44 (87.3)	32B9446H24	6.13 (155.6)	—	0.31 (7.9)–18
100A long	451D874G02	0.69–0.94 (17.5 to 23.8)		—	3.75 (95.2)	32B9446H25	6.13 (155.6)	—	0.31 (7.9)–18
100A long	451D874G02	0.38–0.63 (9.5 to 15.9)		—	4.06 (103.1)	32B9446H26	6.13 (155.6)	—	0.31 (7.9)–18
100A long	451D874G02	0.25–0.31 (6.4 to 7.9)		—	4.38 (111.3)	32B9446H27	6.13 (155.6)	—	0.31 (7.9)–18
<b>For 110 to 225 Ampere Circuit Breakers</b>									
225A short	374D883G01	1.00 (25.4)		1.06 (26.9)	—	374D883H06	—	4.25 (108.0)	0.44 (11.1)–14
225A short	374D883G01	0.69–0.94 (17.5 to 23.8)		1.38 (34.9)	—	374D883H07	—	4.25 (108.0)	0.44 (11.1)–14
225A short	374D883G01	0.38–0.63 (9.5 to 15.9)		1.69 (42.9)	—	374D883H08	—	4.25 (108.0)	0.44 (11.1)–14
225A short	374D883G01	0.25–0.31 (6.4 to 7.9)		2.00 (50.8)	—	374D883H09	—	4.25 (108.0)	0.44 (11.1)–14
225A long	374D883G02	1.00 (25.4)		—	3.44 (87.3)	374D883H10	7.50 (190.5)	—	0.44 (11.1)–14
225A long	374D883G02	0.69–0.94 (17.5 to 23.8)		—	3.75 (95.2)	374D883H11	7.50 (190.5)	—	0.44 (11.1)–14
225A long	374D883G02	0.38–0.63 (9.5 to 15.9)		—	4.06 (103.1)	374D883H12	7.50 (190.5)	—	0.44 (11.1)–14
225A long	374D883G02	0.25–0.31 (6.4 to 7.9)		—	4.38 (111.3)	374D883H13	7.50 (190.5)	—	0.44 (11.1)–14

**F-Frame**



**Note**

① Not UL listed.

# 2.3

## Molded Case Circuit Breakers

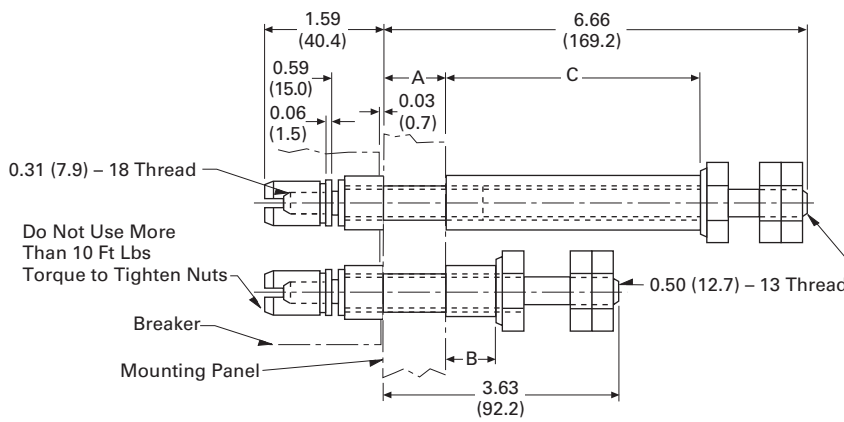
### Series C

Approximate Dimensions in Inches (mm)

2

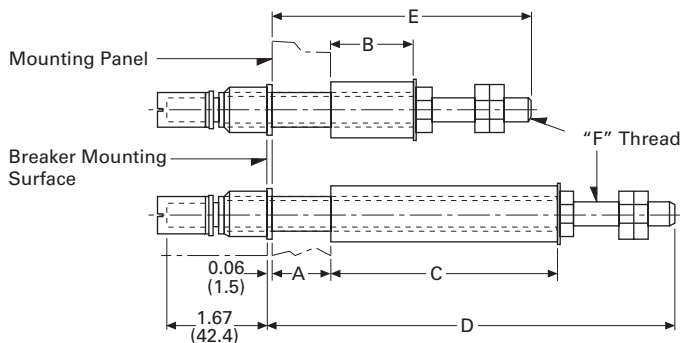
#### J-Frame

Stud Ampere Rating	Stud Catalog Number	Panel Thickness		Tube Length			Tube Catalog Number
		A		B	C		
250A short	5010D23G01	0.75–1.00 (19.1–25.4)		0.84 (21.4)	—	—	456D983H05
250A short	5010D23G01	0.50–0.75 (12.7–19.1)		1.09 (27.7)	—	—	456D983H06
250A short	5010D23G01	0.25–0.50 (6.4–12.7)		1.03 (26.2)	—	—	456D983H07
250A long	5010D23G02	0.75–1.00 (19.1–25.4)		—	3.88 (98.6)	—	5010D23H05
250A long	5010D23G02	0.50–0.75 (12.7–19.1)		—	4.13 (104.9)	—	5010D23H06
250A long	5010D23G02	0.25–0.50 (6.4–12.7)		—	4.38 (111.3)	—	5010D23H07



#### K-Frame ①

Stud Ampere Rating	Stud Catalog Number	Panel Thickness		Tube Length			Standard Tube Catalog Number			Dimensions		
		A		B	C		D	E	F	D	E	F
400A short	6642C14G02	0.75–1 (19.1–25.4)		0.84 (21.3)	—	—	313C909H17	—	3.66 (93.0)	—	—	0.75–16 (19.1–406.4)
400A short	6642C14G04	0.50–0.75 (12.7–18.4)		1.09 (27.69)	—	—	313C909H18	—	—	—	—	—
400A short	6642C14G06	0.25–0.5 (6.35–12.7)		1.03 (26.16)	—	—	313C909H19	—	—	—	—	—
400A long	6642C14G03	0.75–1 (19.1–25.4)		—	—	3.78 (96.0)	313C909H20	—	—	—	—	—
400A long	6642C14G05	0.50–0.75 (12.7–18.4)		—	—	4.03 (102.4)	313C909H21	6.58 (167.1)	—	—	—	—
400A long	6642C14G07	0.25–0.5 (6.35–12.7)		—	—	4.28 (108.7)	313C909H22	—	—	—	—	—



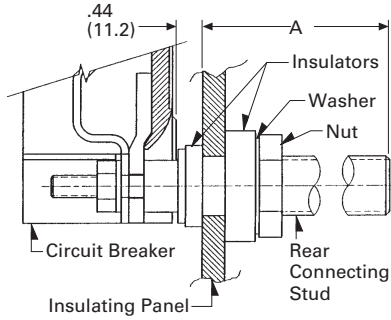
#### Note

① Not UL listed.

Approximate Dimensions in Inches (mm)

**L-Frame**

Stud Length (A)	Stud Catalog Number
5.47 (138.9)	314C960G07
7.97 (202.4)	314C960G08
10.47 (265.9)	314C960G09



**M-Frame**

Stud Ampere Rating	Diameter and Thread	Extension Back of Breaker	Stud Catalog Number
225	0.50 (12.7)-13	3.66 (93.0)	314C960G01
400	0.75 (19.1)-16	5.91 (150.1)	314C960G04
400	0.75 (19.1)-16	8.41 (213.6)	314C960G05
400	0.75 (19.1)-16	10.91 (277.0)	314C960G06
600	1.00 (25.4)-12	5.91 (150.1)	314C960G07
600	1.00 (25.4)-12	8.41 (213.6)	314C960G08
600	1.00 (25.4)-12	10.91 (277.0)	314C960G09
800	1.13 (28.7)-12	5.91 (150.1)	314C960G10
800	1.13 (28.7)-12	8.41 (213.6)	314C960G11
800	1.13 (28.7)-12	10.91 (277.0)	314C960G12

**N-Frame**

Stud Ampere Rating	Diameter and Thread	Extension Back of Breaker	Stud Catalog Number
800	1.13 (28.7)-12	5.5 (139.7)	623B222G01
800	1.13 (28.7)-12	8.0 (203.2)	623B222G02
800	1.13 (28.7)-12	10.5 (266.7)	623B222G03
1200	1.25 (31.8)-12	5.5 (139.7)	373B375G04
1200	1.25 (31.8)-12	10.5 (266.7)	373B375G03

# 2.4

## Molded Case Circuit Breakers

### Definite Purpose

2

GP, FP, KP, LP and MP Frames



*Definite Purpose Molded Case Circuit Breaker Family*

### Contents

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Features . . . . .	<b>V4-T2-329</b>
Base Mounting Hardware . . . . .	<b>V4-T2-329</b>
Line and Load Termination . . . . .	<b>V4-T2-329</b>
Optional Line and Load Terminals . . . . .	<b>V4-T2-329</b>
Catalog Number Selection . . . . .	<b>V4-T2-330</b>
Product Selection . . . . .	<b>V4-T2-331</b>
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Dimensions . . . . .	<b>V4-T2-332</b>



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Drawings  
Online

### Definite Purpose Molded Case Circuit Breakers

*Optimized solution for HVAC/R and Pumping Applications.*

#### Product Overview

##### **GP, FP, KP, LP and MP Frames 15–800 Amperes NEMA 480 Vac**

Eaton’s Definite Purpose molded case circuit breakers are available in three-pole configurations, and are designed to meet the specific requirements of HVAC/R and pumping applications.

As with other members of Eaton’s family of molded case circuit breakers, Definite Purpose breakers provide high quality, reliability, unmatched performance and outstanding value.

Eaton’s Definite Purpose breakers are rated from 15–800A and are available in five frame sizes. Each frame size has the same compact outside dimensions as Series C breakers.

Additionally, Definite Purpose breakers have been rigorously tested to the UL 489 standard. They are assembled in an ISO certified facility.

#### **Trip Units and Terminals**

Definite Purpose breakers contain factory-sealed thermal-magnetic trip units.

The GP-Frame breaker (15–100A) includes line and load terminals and breaker mounting hardware.

FP (15–225A), KP (200–400A), LP (450–600A) and MP (700–800A) Frames ship standard without mounting hardware. For line and load terminals, add “L” to the end of the catalog number or “W” for no terminals.

#### **External Accessories**

Definite Purpose breakers use the same external accessories as Series C breakers: handle mechanisms, motor operators, lock-off devices, busbar extensions and multiple terminal arrangements.

### Product Selection Guide

#### Electrical Characteristics



Breaker Type		GPS	FPS	FPH	KPS	KPH
Amperage range		15–100A	15–225A	15–225A	200–400A	200–400A
Performance level		<b>S</b>	<b>S</b>	<b>H</b>	<b>S</b>	<b>H</b>
Breaker capacity (kA rms)	240 Vac	65	65	100	65	100
	480 Vac	22	35	65	35	65
NEMA, UL, CSA	600 Vac	—	18	25	25	35
Number of poles		3	3	3	3	3
Maximum voltage (Vac)		480	600	600	600	600
Thermal-magnetic		■	■	■	■	■

# 2.4

## Molded Case Circuit Breakers

Definite Purpose

2

### Electrical Characteristics, continued



Breaker Type		LPS	LPH	MPS	MPH
Amperage range		450–600A	450–600A	700–800A	700–800A
Performance level		<b>S</b>	<b>H</b>	<b>S</b>	<b>H</b>
Breaker capacity (kA rms)	240 Vac	65	100	65	100
	480 Vac	35	65	50	65
NEMA, UL, CSA	600 Vac	25	35	25	35
Number of poles		3	3	3	3
Maximum voltage (Vac)		600	600	600	600
Thermal-magnetic		■	■	■	■

**Features**

**Base Mounting Hardware**

English base mounting hardware is included with GP frame only. For all other frames, order base mounting hardware separately as per the table to the right.

**Base Mounting Hardware**

Frame	Catalog Number	
	English	Metric
GP	Included	—
FP	<b>BMH1</b>	<b>BMH1M</b>
KP	<b>BMH3</b>	<b>BMH3M</b>
LP	<b>BMH4</b>	<b>BMH4M</b>
MP	<b>BMH5</b>	<b>BMH5M</b>

**Note:** Base mounting hardware, is included with GP-Frame breakers. A separate catalog number is not required.

**Line and Load Terminals**

Both line and load terminals are included with GP-Frame Definite Purpose breakers. For all other frames, add “L” for line and load terminals to be included or “W” for no terminals.

**Line and Load Termination**

Breaker	Termination Type	Awg Wire Range	Metric Wire Range (mm)	Wire Type	Bolt Size English	Bolt Size Metric	Torque Lb-In	Torque Nm	Catalog Number
GP	Wire	#14–1/0	2.5–50	Cu only	—	—	45	5.1	<b>Included</b>

**Optional Line and Load Terminals**

Breaker	Maximum Amperes	Awg Wire Range	Wire Type	Catalog Number	Catalog Number with Control Wire Termination
FP	100	#14–#10	Cu/Al	<b>3T100FB</b> ①	—
	100	#8	Cu/Al	<b>3T100FB</b> ①	—
	100	#6–#4	Cu/Al	<b>3T100FB</b> ①	—
	100	#3–4/0	Cu/Al	<b>3T100FB</b> ①	—
	200	#3–4/0	Cu only	<b>3T150FB</b> ①	—
	225	#4–4/0	Cu/Al	<b>3TA225FB</b> ①	—
	225	#6–300	Cu/Al	<b>3TA225FDK</b> ①	—
KP	400	250–500 (1)	Cu/Al	<b>TA350K</b>	—
	400	3/0–250 (2)	Cu/Al	<b>3TA400K</b> ①	<b>3TA400KCW</b>
LP	500	250–350 (2)	Cu/Al	<b>TA602LD</b>	<b>TA602LDCW</b>
	600	400–500 (2)	Cu/Al	<b>3TA603LDK</b> ①	<b>3TA603LDCW</b>
MP	800	3/0–400 (3)	Cu/Al	<b>TA800MA2</b>	<b>TA800MA2CWT</b>
	800	500–750 (2)	Cu/Al	<b>TA801MA</b>	<b>TA801MACWT</b>

**Note**

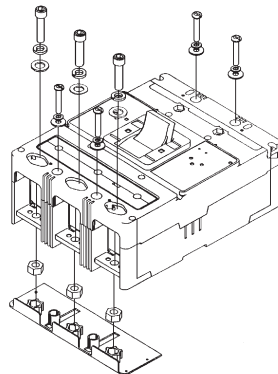
① Package of three terminals.

**Accessories**

**End Cap Accessory Kit**

End caps for line and load conductor termination are optional with each breaker. End caps secure the conductor with a ring-type connector. The kit includes one end cap, three cap screws, three nuts and three lock washers.

**End Cap Accessory Kit**



**Series C Accessories**

For internal accessories, see **Page V4-T2-268**.

For external accessories, see **Page V4-T2-299**.



# 2.4

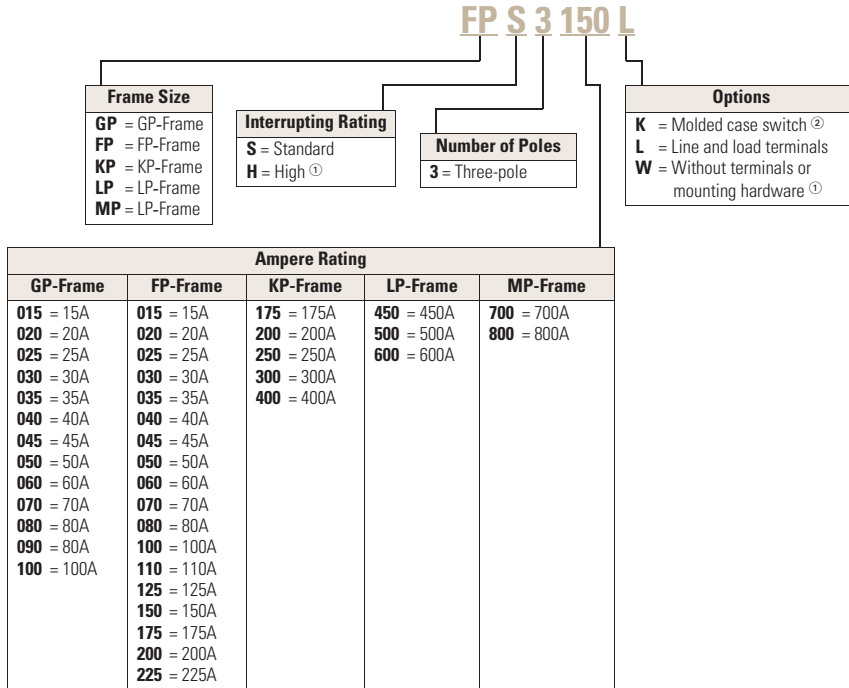
## Molded Case Circuit Breakers

### Definite Purpose

#### Catalog Number Selection

This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

2



**Notes**

- ① Not available on GP-Frame.
- ② When choosing a molded case switch, select the highest amperage rating for the frame and the standard interrupting rating.

**Product Selection**

**Catalog Numbers**

When ordering Definite Purpose breakers, use the appropriate catalog numbers given below.

**GP 100**



**GP-Frame/15–100A**

**Frame/  
Ampere Rating**

GP/15–100A circuit breakers

**Three-Pole  
Catalog  
Number**

- GPS3015
- GPS3020
- GPS3025
- GPS3030
- GPS3035
- GPS3040
- GPS3045
- GPS3050
- GPS3060
- GPS3070
- GPS3080
- GPS3090
- GPS3100

GP/100A molded case switch

GPS3100K

**Note:** All GP frames come standard with line and load terminals and base mounting hardware. Not available without terminals.

**FP 225**



**FP-Frame/15–225A**

**Frame/  
Ampere Rating**

FP/15–225A circuit breakers

**Three-Pole  
Catalog  
Number**

- FPS3015
- FPS3020
- FPS3025
- FPS3030
- FPS3035
- FPS3040
- FPS3045
- FPS3050
- FPS3060
- FPS3070
- FPS3080
- FPS3090
- FPS3100
- FPS3110
- FPS3125
- FPS3150
- FPS3175
- FPS3200
- FPS3225
- FPH3015
- FPH3020
- FPH3025
- FPH3030
- FPH3035
- FPH3040
- FPH3045
- FPH3050
- FPH3060
- FPH3070
- FPH3080
- FPH3090
- FPH3100
- FPH3110
- FPH3125
- FPH3150
- FPH3175
- FPH3200
- FPH3225

FP/225A molded case switch

FPS3225K

**Note:** At the end of catalog number, add “L” for terminals or “W” for no terminals.

**KP 250**



**KP-Frame/200–400A**

**Frame/  
Ampere Rating**

KP/175–400A circuit breakers

**Three-Pole  
Catalog  
Number**

**KPS3175**

**KPS3200**

**KPS3250**

**KPS3300**

**KPS3400**

**KPH3175**

**KPH3200**

**KPH3250**

**KPH3300**

**KPH3400**

KP/400A molded case switch

**KPS3400K**

**LP 400**



**LP-Frame/450–600A**

**Frame/  
Ampere Rating**

LP/450–600A circuit breakers

**Three-Pole  
Catalog  
Number**

**LPS3450**

**LPS3500**

**LPS3600**

**LPH3450**

**LPH3500**

**LPH3600**

LP/600A molded case switch

**LPS3600K**

**MP 800**



**MP-Frame/700–800A**

**Frame/  
Ampere Rating**

MP/700–800A circuit breakers

**Three-Pole  
Catalog  
Number**

**MPS3700**

**MPS3800**

**MPH3700**

**MPH3800**

MP/800A molded case switch

**MPS3800K**

**Note:** For KP, LP, MP frames above, add “L” for terminals or “W” for no terminals to end of catalog number.

**Dimensions**

Approximate Dimensions in Inches (mm)

All dimensions are provided for guidance and should not be used for construction purposes unless approved.

Contact Eaton for detailed outline drawings.

**GP, FP, KP, LP and MP Definite Purpose Frames**

	Breaker Type				
	GP	FP	KP	LP	MP
Width	3.00 (76.2)	4.13 (104.9)	5.49 (139.4)	8.25 (209.6)	8.25 (209.6)
Height	4.88 (124.0)	6.00 (152.4)	10.12 (257.0)	10.75 (273.1)	16.00 (406.4)
Depth	2.63 (66.7)	3.38 (85.9)	4.31 (109.6)	3.81 (96.8)	4.06 (103.1)

PM3 Modules



Power Monitoring and Metering with Modbus RTU

Contents

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**PM3 Monitoring and Metering Module**

**Product Description**

The PM3 is the perfect solution for main, branch circuit and standalone monitoring/metering applications. With information at your fingertips, you can meter, monitor and communicate phase current and voltage with calculated power and energy.

The PM3 is versatile, as it connects to the load side of a molded-case circuit breaker (MCCB) and communicates easily to a local network or the Internet through Eaton Power Xpert® Gateways (PXGs). Cost of ownership is reduced through ease of installation. The PM3 is your ideal MCCB metering solution.

**Application Description**

- Communications via Modbus® and Eaton's INCOM™ protocol; compatible with Eaton's PXG for Web page and Ethernet capabilities
- Works in 240 Vac PM3, 480 Vac and 600 Vac applications
  - 480 Vac PM3 has internal power supply to power electronics
  - 600 Vac PM3 requires 24 Vdc auxiliary power
- Seamlessly integrates with thermal-magnetic or electronic trip units

**Features and Benefits**

- Communicates electrical system data and circuit breaker status
- Calculates power and energy to an accuracy of 1.0% of reading
- Configurable with thermal-magnetic or electronic trip units
- Suitable for reverse-feed applications
- Easy to install

**PM3 Benefits When Combined with 310+ Electronic Trip Unit**

- Alarming: high load and ground fault
- Zone selective interlocking
- Arcflash Reduction Maintenance System™
- Cause-of-trip localized information through Digiview and TRIP-LED
- Modbus/INCOM communications
- HMI connectivity through PXG
- Current and voltage metering to 0.5% of reading
- Power and energy monitoring to 1.0% of reading
- Reduces cost of ownership

**Standards and Certifications**

- Meets ANSI C12.1 revenue grade standard with a current and voltage accuracy of 0.5% of reading
- UL 489, Annex J
- IEC 61000-4-2—ESD
- IEC 61000-4-4—EFT
- IEC 61000-4-5—SURGE
- IEC 61000-4-6—EMC
- ANSI C12.1 (1% accuracy)
- UL/cUL/CE



#### Product Selection

2

#### PM3 Modules

Frame	Catalog Number	
	480V	600V
<b>Modbus</b>		
FD	—	<b>PM3FM</b>
JG	—	<b>PM3JM</b>
KD and LG	—	<b>PM3LM</b>
<b>INCOM</b>		
FD	<b>PM3FI480</b>	<b>PM3FI600</b>
JG	<b>PM3JI480</b>	<b>PM3JI600</b>
KD and LG	<b>PM3LI480</b>	<b>PM3LI600</b>

#### End Cap Kits (Sold Separately)

Frame	Description	Catalog Number
FD	Metric end cap kit for F-Frame	<b>KPEKM1</b>
	English end cap kit for F-Frame	<b>KPEK1</b>
JG	Metric end cap kit for JG-Frame	<b>FJ3RTWK</b>
	English end cap kit for JG-Frame	<b>FJ3RTDK</b>
KD	Metric end cap kit for K-Frame	<b>KPEKM3</b>
	English end cap kit for K-Frame	<b>KPEK3</b>
LG	Metric end cap kit for LG-Frame	<b>L3RTWK</b>

#### Technical Data and Specifications

##### Metered parameters

- $I_A, I_B, I_C$
- $V_{AB}, V_{BC}, V_{CA}, V_{an}, V_{bn}, V_{cn}$
- Apparent Energy, Forward Real Energy, Reverse Real Energy, Net Real Energy, Lagging Reactive Energy, Leading Reactive Energy, Net Reactive Energy
- Apparent Power A, B, C; Apparent Power Total; Reactive Power A, B, C; Reactive Power Total; Real Power A, B, C; Real Power Total
- Frequency, Apparent Power Factor, Apparent PFA, Apparent PFB, Apparent PFC

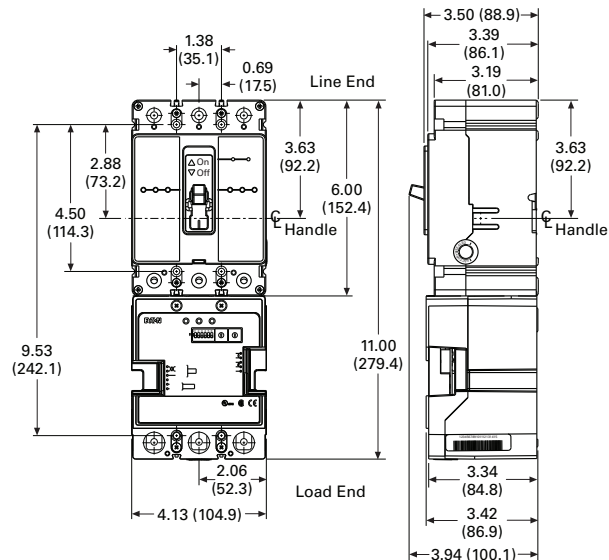
#### PM3 Power Monitoring and Communications Module Technical Specifications for Modbus RTU

Description	Specification
<b>Current Inputs</b>	
Pickup current	0.3A rms
Maximum reported current	FD/JG 250A rms KD/LD 630A rms
Accuracy	0.5% of reading
<b>Voltage Inputs</b>	
Range	Line-to-neutral 30–366 Vac Line-to-line 52–635 Vac
Supported systems	Three-element wye, three-element wye + neutral Two-element delta, four-wire delta systems
Input impedance	996 kilohm/phase
Burden per phase	0.36 VA/phase max. at 600V; 0.014 VA at 120V
Phase voltage connections	Internal via screw terminal to busbar For wye system, a neutral is required to be connected to the PM3 on the right Phoenix connector.
Neutral connection	If neutral is not available, the meter will calculate a virtual neutral based on the phase-to-phase rms voltage. The system voltage must be balanced for this to be accurate.
<b>Frequency</b>	
Frequency	50/60 Hz
Accuracy	± 0.1 Hz
Resolution	0.1 Hz
<b>Power and Energy</b>	
Accuracy	1% of reading (ANSI C12.1)
<b>Isolation</b>	
All inputs and outputs are galvanically isolated to 2500V.	
<b>Environmental Ratings</b>	
Operating temperature	–20°C to +50°C
Storage temperature	–20°C to +50°C
Operating humidity	5 to 95% RH noncondensing
<b>Sensing Method</b>	
Voltage, current	True rms
Sampling rate	13.02K samples per second
<b>Update Rate</b>	
Watts, VAR and VA	1.03 sec at 60 Hz
All other parameters	1.07 sec at 60 Hz
<b>Power Supply (External)</b>	
DC voltage	18–30 Vdc
Maximum current	30.0 mA at 24 Vdc
Burden	0.72W
<b>Standard Communication Format</b>	
Connection type	Three-wire RS-485 (A, B, Common)
Com port baud rate	9600 or 19,200 bauds Default: 19,200 bauds
Modbus address range	01–247
Data format	Selectable (8, N, 1   8, N, 2   8, Even, 1   8, Odd, 1) Default: 8, N, 2
Protocols	Modbus RTU
Internal termination resistor selectable ON or OFF	Via DIP switch Default: Enabled

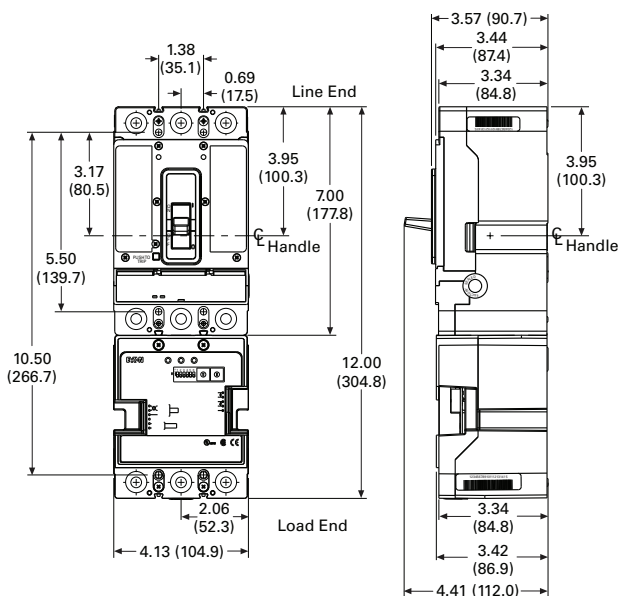
**Dimensions and Weights**

Approximate Dimensions in Inches (mm)

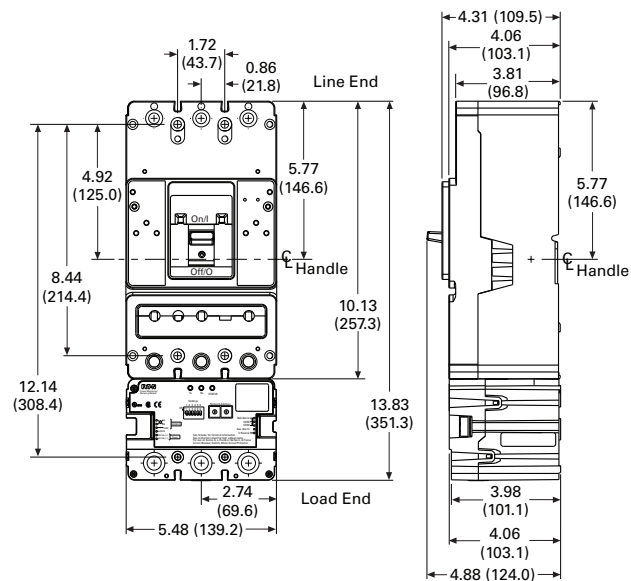
**FD Three-Pole with PM3 Modbus**



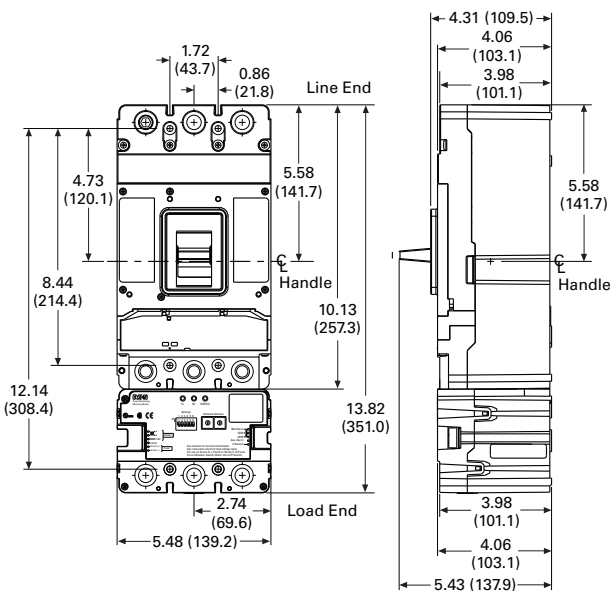
**JG Three-Pole with PM3 Modbus**



**KD Three-Pole with PM3 Modbus**



**LG Three-Pole with PM3 Modbus**



**PM3 Dimensions and Shipping Weights**

Description	Frame	Dimensions and Weights
Weight in lbs (kg)	FD	1.26 (0.57)
	JG	1.60 (0.73)
	KD/LG	2.25 (1.02)
Basic unit in inches (mm)	FD	4.13 W x 5.00 L x 3.39 H (104.9 x 127.0 x 86.1)
	JG	4.13 W x 5.00 L x 3.39 H (104.9 x 127.0 x 86.1)
	KD/LG	5.48 W x 3.70 L x 4.06 H (139.2 x 94.0 x 103.2)
Shipping container dimensions in inches (mm)	FD/JG	8.00 x 5.13 x 5.50 (203.2 x 130.3 x 139.7)
	KD/LG	6.25 x 8.25 x 7.00 (158.7 x 209.5 x 177.8)

# 2.6

## Molded Case Circuit Breakers

### Specialty Breakers

#### Engine Generator Circuit Breakers

2



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Direct Current Circuit Breakers . . . . .	<b>V4-T2-342</b>
PVGard Solar Circuit Breakers—600 Vdc Per-Pole and 1000 Vdc Poles-in-Series. . . . .	<b>V4-T2-355</b>
E <sup>2</sup> Mining Service Circuit Breakers . . . . .	<b>V4-T2-367</b>
Classic Mining Breakers. . . . .	<b>V4-T2-390</b>
Add-On Ground Fault Protection—Type GFR . . . . .	<b>V4-T2-404</b>



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#### Engine Generator Circuit Breakers

##### Product Description

Eaton's engine generator molded case circuit breakers are designed specifically for application on diesel engine powered standby generators where high interrupting circuit breakers are not required. The JG through NG breakers are equipped with a special trip unit, that includes standard thermal (overload) protection and special low magnetic pickup range (FG includes a fixed thermal-magnetic pickup). The standard thermal trip unit provides overload protection for conductors per the National Electrical Code®. The low magnetic pickup range is approximately two to five times the continuous rating and provides closer low-level short-circuit protection when applied on generators that have very low short-circuit capacity. This combination allows the user to customize the breaker to the generator output.

##### Application Description

Engine generator circuit breakers are suitable for reverse feed application.

##### Standards and Certifications

Engine generator molded case circuit breakers are designed to conform with the following standards:

- Underwriters Laboratories Standard UL 489, Molded Case Circuit Breakers and Circuit Breaker Enclosures File E7819
- Canadian Standards Association Standard C22.2 No. 5, Service Entrance and Branch Circuit Breakers
- International Electrotechnical Commission Recommendations IEC 947-2, Circuit Breakers



Listed  
Conformance with these standards satisfies most local and international codes, assuming user acceptability and simplified application.

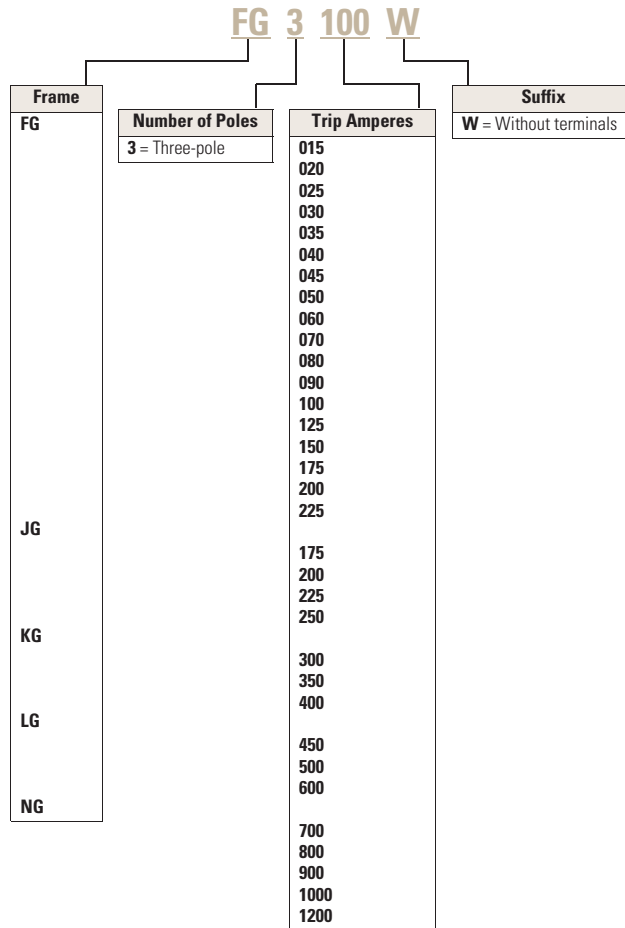
### Catalog Number Selection

This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers.

- FG breakers include both line and load side terminals

- JG, KG, LG and NG breakers with **W** catalog number suffix do not include any terminals
- JG, KG, LG and NG breakers without **W** catalog number suffix include both line and load terminals
- Contact Eaton for additional ratings and internal/external accessories
- Reverse feed

### Circuit Breakers FG, JG, KG, LG and NG





# 2.6

## Molded Case Circuit Breakers

### Specialty Breakers

#### Product Selection

The following table lists FG through NG engine generator breakers with the maximum generator kVA and kW rating. Engine generator breakers are applied at 115% of the

generator full load current rating (FLA). The maximum kW rating is based on three-phase generators at 80% power factor.

#### Thermal-Magnetic

Magnetic Pickup Range	Maximum Generator Rating 60 Hz		480 Vac		600 Vac		Engine Generator Breaker <sup>③</sup>
	240 Vac kVA <sup>①</sup>	kW <sup>②</sup>	kVA <sup>①</sup>	kW <sup>②</sup>	kVA <sup>①</sup>	kW <sup>②</sup>	Catalog Number
Fixed	5	4	11	9	14	11	FG3015 <sup>④</sup>
Fixed	7	6	14	12	18	14	FG3020 <sup>④</sup>
Fixed	9	7	18	14	23	18	FG3025 <sup>④</sup>
Fixed	11	9	22	17	27	22	FG3030 <sup>④</sup>
Fixed	13	10	25	20	32	25	FG3035 <sup>④</sup>
Fixed	14	12	29	23	36	29	FG3040 <sup>④</sup>
Fixed	16	13	32	26	41	32	FG3045 <sup>④</sup>
Fixed	18	14	36	29	45	36	FG3050 <sup>④</sup>
Fixed	22	17	43	35	54	43	FG3060 <sup>④</sup>
Fixed	25	20	51	40	63	51	FG3070 <sup>④</sup>
Fixed	29	23	58	46	72	58	FG3080 <sup>④</sup>
Fixed	32	26	65	52	81	65	FG3090 <sup>④</sup>
Fixed	36	29	72	58	90	72	FG3100 <sup>④</sup>
Fixed	40	32	79	64	99	79	FG3110 <sup>④</sup>
Fixed	45	36	90	72	113	90	FG3125 <sup>④</sup>
Fixed	54	43	108	87	135	108	FG3150 <sup>④</sup>
Fixed	63	51	126	101	158	126	FG3175 <sup>④</sup>
Fixed	72	58	144	116	181	144	FG3200 <sup>④</sup>
Fixed	81	65	162	130	203	162	FG3225 <sup>④</sup>
350–700	63	51	126	101	158	126	JG3175W <sup>⑤</sup>
350–700	63	51	126	101	158	126	JG3175 <sup>④</sup>
350–700	72	58	144	116	181	144	JG3200W <sup>⑤</sup>
350–700	72	58	144	116	181	144	JG3200 <sup>④</sup>
350–700	81	65	162	130	203	162	JG3225W <sup>⑤</sup>
350–700	81	65	162	130	203	162	JG3225 <sup>④</sup>
350–700	90	72	181	144	226	181	JG3250W <sup>⑤</sup>
350–700	90	72	181	144	226	181	JG3250 <sup>④</sup>
500–1000	108	87	217	173	271	217	KG3300W <sup>⑤</sup>
500–1000	108	87	217	173	271	217	KG3300 <sup>④</sup>
500–1000	126	101	253	202	316	253	KG3350W <sup>⑤</sup>
500–1000	126	101	253	202	316	253	KG3350 <sup>④</sup>
1000–2000	144	116	289	231	361	289	KG3400 <sup>④</sup>

#### Notes

- ① Breaker continuous current is based on 115% of the generator full load ampere rating.
- ② Based on three-phase generators at 80% power factor.
- ③ FG, JG, KG include thermal-magnetic trip units, LG and NG include electronic trip units.
- ④ Breaker includes line and load terminals.
- ⑤ Without terminals.

The following catalog numbers have center tap studs for dual voltage applications: JG3070CT, JG3100CT, JG3125CT, KG3175CT, LG3300CTW.

## Electronic

Magnetic Pickup Range	Maximum Generator Rating 60 Hz						Engine Generator Breaker <sup>③</sup>
	240 Vac		480 Vac		600 Vac		Catalog Number
	kVA <sup>①</sup>	kW <sup>②</sup>	kVA <sup>①</sup>	kW <sup>②</sup>	kVA <sup>①</sup>	kW <sup>②</sup>	
500–2500	162	130	325	260	406	325	<b>LG3450</b> <sup>④</sup>
500–2500	181	144	361	289	451	361	<b>LG3500</b> <sup>④</sup>
500–2500	217	173	433	347	542	433	<b>LG3600</b> <sup>④</sup>
500–2500	253	202	505	404	632	505	<b>NG3700</b> <sup>④</sup>
500–2500	289	231	578	462	722	578	<b>NG3800</b> <sup>④</sup>
1250–5000	325	260	650	520	812	650	<b>NG3900</b> <sup>④</sup>
1250–5000	361	289	722	578	903	722	<b>NG31000</b> <sup>④</sup>
1250–5000	433	347	867	693	1083	867	<b>NG31200</b> <sup>④</sup>

**Notes**

- ① Breaker continuous current is based on 115% of the generator full load ampere rating.  
 ② Based on three-phase generators at 80% power factor.  
 ③ FG, JG, KG include thermal-magnetic trip units, LG and NG include electronic trip units.  
 ④ Breaker includes line and load terminals.

The following catalog numbers have center tap studs for dual voltage applications: JG3070CT, JG3100CT, JG3125CT, KG3175CT, LG3300CTW.

### Accessories Selection Guide and Ordering Information

#### Enclosures

##### Type 1 General Purpose

- Surface or flush mounting
- 15–1200 ampere range
- 600 Vac, 500 Vdc

Type 1 enclosed breakers are designed for use in commercial buildings, apartment buildings and other areas where a general purpose enclosure is applicable. The breaker is front operable and is capable of being padlocked in either the ON or OFF position. Ratings through 1200 amperes are listed with Underwriters Laboratories as approved for service entrance application. Both surface and flush mounted enclosures are available.

##### Type 3R Rainproof Surface Mounting

- Interchangeable hubs (through 400 amperes)
- 15–1200 ampere range
- 600 Vac, 500 Vdc

This general purpose outdoor service center employs a circuit breaker inside a weatherproof sheet steel breaker enclosure to serve

as a main disconnect and protective device for feeder circuits. Ratings through 1200 amperes are listed by Underwriters Laboratories as suitable for service entrance application.

##### Type 12 Dustproof Surface Mounting

- No knockouts or other openings
- 15–1200 ampere range
- 600 Vac, 500 Vdc

The Type 12 enclosure is designed in line with specifications for special industry applications where unusually severe conditions involving oil, coolant, dust and other foreign materials exist in the operating atmosphere. The handle padlocks in the OFF position and the cover is interlocked with the handle mechanism to prevent opening the cover with the circuit breaker in the ON position. Ratings through 1200 amperes are listed by Underwriters Laboratories as suitable for service entrance application.

#### Enclosure Selection Data

Breaker Frame Amperes	Enclosure Type Class	Catalog Number
FG 15–225	Type 1	SFDN225
	Type 3R	RFDN225
	Type 12	JFDN225
JG 175–250	Type 1	SJDN250
	Type 3R	RJDN250
	Type 12	JJDN250
KG 300–400	Type 1	SKDN400
	Type 3R	RKDN400
	Type 12	JKDN400
LG 450–600	Type 1	SLDN600
	Type 3R	RLDN600
	Type 12	JLDN600
NG 700–1200	Type 1	SNDN1200
	Type 3R	RNDN1200
	Type 12	JNDN1200

### Options and Accessories

#### Standard Terminals

Breaker Frame	Max. Amp Rating	AWG Wire Range	Metric Wire Range mm <sup>2</sup>	Catalog Number
FG	100	14–1/0	2.5–50	3T100FB ①
FG	150	4–4/0	25–95	3TA225FD ①
JG	250	4–350 kcmil	25–185	TA250KB
KG	350	250–500 kcmil	120–240	TA350K
KG	400	3/0–250 kcmil (2)	95–120	3TA400K ①
LG	600	250–500 kcmil (2)	120–240	3TA603LDK
NG	700	1–500 kcmil (2)	50–300	TA700NB1
NG	1000	3/0–400 kcmil (3)	95–185	TA1000NB1
NG	1200	4/0–500 kcmil (4)	120–300	TA1200NB1

#### Neutral Kits, Insulated and Groundable

Max. Enclosure Rating (Amperes)	Main Lug Number Size Cu/Al	Ground Lug Size Cu/Al	Catalog Number
100	(1) 14–1/0	(1) 14–1/0	INK100
250	(1) 6–350 kcmil	(1) 4–300 kcmil	INK250
400	(1) 4–750 kcmil or (2) 1/0–250 kcmil	(1) 4–300 kcmil	INK400
600	(2) 250–500 kcmil	(1) 4–300 kcmil	INK600
1200	(3) 1/0 to 750 kcmil or (4) 1/0 to 750 kcmil	(1) 6–250 kcmil	INK1200

#### Internal Accessories

##### Auxiliary Switch ②

Breaker Frame	Factory Mounted	1A-1B	Factory Mounted	2A-2B
		Field Kit Catalog Number		Field Kit Catalog Number
FG ③	A06	A1X1PK	A13	A2X1RPK
JG	A06	A1X2PK	A13	A2X2PK
KG	A06	A1X3PK	A13	A2X3PK
LG	A06	A1X4PK	A13	A2X4PK
NG	A06	A1X5PK	A13	A2X5PK

##### Shunt Trip ②

Breaker Frame	Rating	Factory Mounted	Field Kit Catalog Number
FG ③	12–24 Vdc	S02	SNT1LP03K
JG	12–24 Vdc	S42	SNT2P04K
KG	12–24 Vdc	S42	SNT3P04K
LG	12–24 Vdc	S02	SNT4LP03K
NG	12–24 Vdc	S02	SNT5LP03K

#### Notes

- ① Package of three terminals.
- ② Other accessories are available. Same as standard frame breakers.
- ③ Field installation on the FG Frame is not UL listed.

**Technical Data and Specifications**

**UL 489 Interrupting Capacity Ratings**

Volts AC (50/60 Hz)	Interrupting Capacity (Symmetrical Amperes)
240	18,000
480	14,000
600	10,000

**IEC 947-2 Interrupting Capacity Ratings**

Volts AC (50/60 Hz)	Interrupting Capacity (Symmetrical Amperes)
220, 240	18,000/9,000
380, 415	14,000/7,000
660, 690	18,000/9,000 14,000/7,000 10,000/5,000

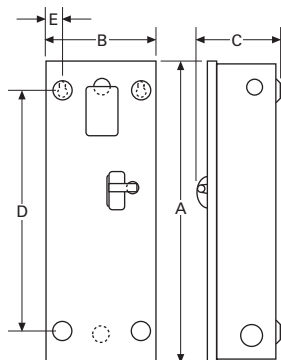
**Dimensions and Weights**

Approximate Dimensions in Inches (mm)

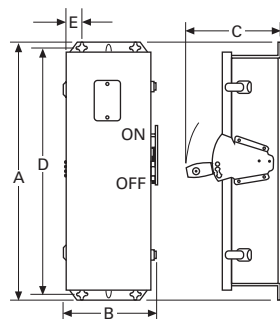
**Enclosure Selection Data**

Breaker Frame Amperes	Enclosure Type Class	A	B	C	D	E	Approx. Weight Lbs (kg)	Conduit Sizes, Inches	Catalog Number
FG 15–225	Type 1	23.25 (590.6)	8.41 (213.6)	6.28 (159.5)	18.75 (476.3)	1.20 (30.5)	15 (7)	0.25, 0.50, 0.75, 1, 1.25, 1.50, 2, 2.50	SFDN225
	Type 3R	25.66 (651.8)	8.84 (224.7)	9.31 (236.5)	24.28 (616.7)	1.70 (43.2)	19 (9)	0.25, 0.50, 0.75, 1, 1.25, 1.50, 2, 2.50	RFDN225
	Type 12	25.66 (651.8)	8.84 (224.7)	9.31 (236.5)	24.28 (616.7)	1.70 (43.2)	18 (8)	—	JFDN225
JG 175–250	Type 1	34.70 (881.4)	10.92 (277.4)	7.20 (182.9)	30.00 (762.0)	1.88 (47.8)	31 (14)	0.25, 0.50, 2, 2.50, 3	SJDN250
	Type 3R	37.50 (952.5)	11.56 (293.6)	10.22 (259.6)	35.77 (908.6)	1.94 (49.3)	40 (18)	0.25, 0.50, 2, 2.50, 3	RJDN250
	Type 12	37.53 (953.3)	11.56 (293.6)	10.22 (259.6)	35.77 (908.6)	1.94 (49.3)	37 (17)	—	JJDN250
KG 300–400	Type 1	38.81 (985.8)	11.06 (280.9)	10.94 (277.9)	34.00 (863.6)	2.28 (57.9)	53 (24)	0.25, 0.50, 0.75, 1.50, 2, 2.50, 3, 3.50	SKDN400
	Type 3R	41.69 (1058.9)	11.75 (298.5)	14.06 (357.1)	39.90 (1013.5)	1.97 (50.0)	60 (27)	0.25, 0.50, 0.75, 2.50, 3, 3.50	RKDN400
	Type 12	41.69 (1058.9)	11.75 (298.5)	14.06 (357.1)	39.90 (1013.5)	1.97 (50.0)	53 (24)	—	JKDN400
LG 450–600	Type 1	45.88 (1165.4)	14.31 (363.5)	12.38 (314.5)	46.56 (1182.6)	1.91 (48.5)	81 (37)	0.25, 0.50, 0.75, 3, 3.50, 4	SLDN600
	Type 3R	48.31 (1227.1)	14.91 (378.7)	15.50 (393.7)	46.56 (1182.6)	1.92 (48.8)	84 (38)	0.25, 0.50, 0.75, 3, 3.50, 4	RLDN600
	Type 12	48.31 (1227.1)	14.91 (378.7)	15.50 (393.7)	46.56 (1182.6)	1.92 (48.8)	81 (37)	—	JLDN600
NG 700–1200	Type 1	61.22 (1555.0)	21.44 (544.6)	15.41 (391.4)	61.84 (1570.7)	1.97 (50.0)	178 (81)	—	SNDN1200
	Type 3R	63.59 (1615.2)	22.00 (558.8)	17.63 (447.8)	61.84 (1570.7)	1.97 (50.0)	175 (79)	—	RNDN1200
	Type 12	63.59 (1615.2)	22.00 (558.8)	17.63 (447.8)	61.84 (1570.7)	1.97 (50.0)	170 (77)	—	JNDN1200

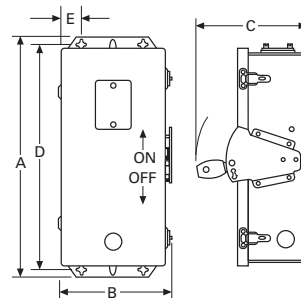
**Type 1 Surface Mounted**



**Type 3R Rainproof**



**Type 12, 12K Dustproof**



**Direct Current Circuit Breakers**



**Direct Current Circuit Breakers**

**Product Description**

DC (direct current) systems and applications are becoming commonplace as alternative energy sources have expanded and the number of DC devices and data centers using DC power has swelled.

Eaton offers molded case circuit breakers and switches to meet circuit protection and switching requirements for a host of different DC end user requirements. Applications include UPS battery supply circuits, solar systems and electric vehicle charging, as well as commercial and industrial distribution.

Current ratings are available from 15 to 3000A, with a full scale of voltage and interrupting ratings to address needs ranging from standard to the highest performance. Optional internal accessories provide remote tripping and indication of breaker status.

The DC breaker family is UL 489 listed and exceeds the requirements in UL 489 Supplement SC for UPS applications. Eaton breakers may be applied in both ungrounded and select grounded applications, with poles connected in series to operate at the maximum voltages shown on **Page V4-T2-343**. To use DC circuit breakers on 600V grounded systems, three poles in series must be connected on the ungrounded leg.

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All DC breakers use the same internal and external accessories as their corresponding Series C and Series G AC frame equivalents, except for the NBDC breaker, which uses the same internal and external accessories as the standard NB frame.

The HFDDC through HMDLDC and EG to RG DC breakers use the same internal and external accessories as their corresponding Series C and Series G AC Frame equivalents. NBDC uses the same internal and external accessories as standard NB breakers.

Many of the Eaton AC molded case circuit breakers carry 250 Vdc ratings for ungrounded systems. Refer to **Pages V4-T2-9** and **V4-T2-112** for these interrupting tables.

**Quick Reference Direct Current Circuit Breakers****UL 489 Interrupting Capacity Ratings**

Circuit Breaker Type	Maximum Amperes	Interrupting Capacity (kA)								
		Volts DC <sup>①</sup>			500			750 <sup>②</sup>		
		125	Poles in Series	250 <sup>②</sup>	Poles in Series	500	600	Poles in Series	750 <sup>②</sup>	Poles in Series
EGEDC	100	10	1	35	2	35	—	3	—	—
EGSDC	100	35	1	42	2	50	—	3	—	—
EGHDC	100	42	1	50	2	65	—	3	—	—
HFDDC	225	42	1	50	2	—	42	3	42	4
JGEDC	250	35	1	35	2	—	35	3	—	—
JGSDC	250	42	1	42	2	—	50	3	—	—
JGHDC	250	50	1	50	2	—	65	3	—	—
HJDDC	250	42	1	50	2	—	42	3	—	—
HKDDC	400	42	1	50	2	—	42	3	—	—
LGEDC	600	22	1	22	2	—	35	3	—	—
LGSDC	600	22	1	22	2	—	50	3	—	—
LGHDC	600	50	1	50	2	—	65	3	—	—
HLDDC	600	42	1	50	2	—	35	3	—	—
HLDDC <sup>③</sup>	1200	42	1	50	2	—	—	—	—	—
HMDLDC	800	42	1	50	2	—	35	3	—	—
NBDC	1200	42	1	50	2	—	50	3	—	—
RGHDC	3000	42	1	50	2	—	65	3	—	—

**IEC 60947-2 Interrupting Capacity Ratings**

Circuit Breaker Type	Maximum Amperes	125 Volts DC		Poles in Series	250 Volts DC		Poles in Series	600 Volts DC		Poles in Series
		Icu	Ics		Icu	Ics		Icu	Ics	
EGEDC	100	10	10	1	10	10	2	—	—	—
EGSDC	100	35	35	1	35	35	2	—	—	—
EGHDC	100	42	42	1	42	42	2	—	—	—
JGEDC	250	22	22	1	22	22	2	—	—	—
JGSDC	250	22	22	1	22	22	2	—	—	—
JGHDC	250	42	42	1	42	42	2	—	—	—
HJDDC	250	—	—	—	—	—	—	20	10	3
LGEDC	600	22	22	1	22	22	2	—	—	—
LGSDC	600	22	22	1	22	22	2	—	—	—
LGHDC	600	42	42	1	42	42	2	—	—	—
HLDDC	600	—	—	—	—	—	—	20	10	3
HMDLDC	800	—	—	—	—	—	—	20	10	3

**Notes**

<sup>①</sup> DC ratings apply to substantially non-inductive circuits. Time constants per UL 489.

<sup>②</sup> EGEDC through HMDLDC have been tested up to 300 Vdc to allow for battery charging voltages. 750 Vdc is common in transportation applications. HFDDC, four-pole 750 Vdc is available up to 150A maximum. 300 Vdc and 750 Vdc are not UL 489 listed voltage ratings.

<sup>③</sup> Four-pole frame with two-poles connected in parallel.

See **Page V4-T2-353** for series connection diagrams. Use NEC rated cable to connect/short poles in series as shown.

# 2.6

## Molded Case Circuit Breakers

### Specialty Breakers

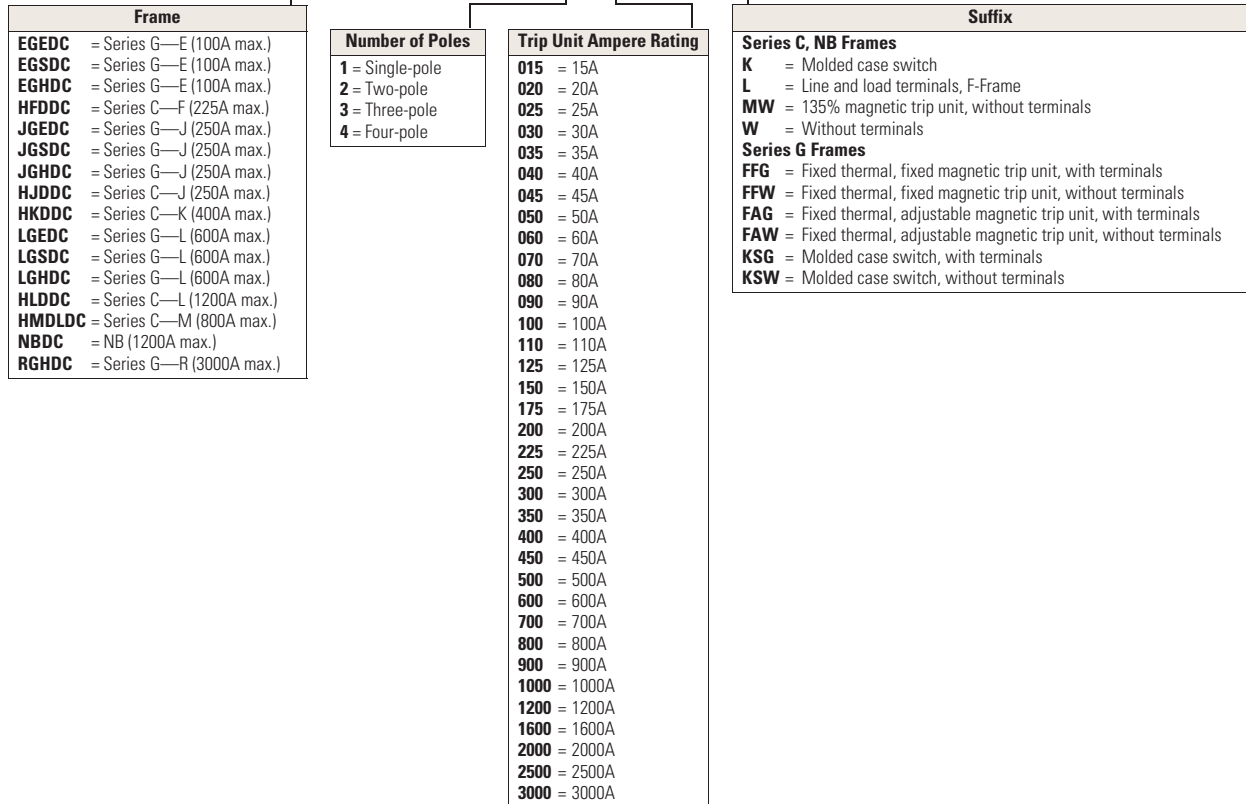
#### Catalog Number Selection

This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

2

#### DC Circuit Breaker

**HFDDC 3 150 W**



**Product Selection**

**Type EGEDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 35 kAIC at 500 Vdc**

Maximum Continuous Ampere Rating at 40°C	Complete Circuit Breaker with Terminals Catalog Number	Complete Circuit Breaker without Terminals Catalog Number
25	EGEDC3025FFG	EGEDC3025FFW
30	EGEDC3030FFG	EGEDC3030FFW
35	EGEDC3035FFG	EGEDC3035FFW
40	EGEDC3040FFG	EGEDC3040FFW
45	EGEDC3045FFG	EGEDC3045FFW
50	EGEDC3050FFG	EGEDC3050FFW
60	EGEDC3060FFG	EGEDC3060FFW
70	EGEDC3070FFG	EGEDC3070FFW
80	EGEDC3080FFG	EGEDC3080FFW
90	EGEDC3090FFG	EGEDC3090FFW
100	EGEDC3100FFG	EGEDC3100FFW

**Type EGHDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 65 kAIC at 500 Vdc**

Maximum Continuous Ampere Rating at 40°C	Complete Circuit Breaker with Terminals Catalog Number	Complete Circuit Breaker without Terminals Catalog Number
25	EGHDC3025FFG	EGHDC3025FFW
30	EGHDC3030FFG	EGHDC3030FFW
35	EGHDC3035FFG	EGHDC3035FFW
40	EGHDC3040FFG	EGHDC3040FFW
45	EGHDC3045FFG	EGHDC3045FFW
50	EGHDC3050FFG	EGHDC3050FFW
60	EGHDC3060FFG	EGHDC3060FFW
70	EGHDC3070FFG	EGHDC3070FFW
80	EGHDC3080FFG	EGHDC3080FFW
90	EGHDC3090FFG	EGHDC3090FFW
100	EGHDC3100FFG	EGHDC3100FFW

**Type EGSDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 50 kAIC at 500 Vdc**

Maximum Continuous Ampere Rating at 40°C	Complete Circuit Breaker with Terminals Catalog Number	Complete Circuit Breaker without Terminals Catalog Number
25	EGSDC3025FFG	EGSDC3025FFW
30	EGSDC3030FFG	EGSDC3030FFW
35	EGSDC3035FFG	EGSDC3035FFW
40	EGSDC3040FFG	EGSDC3040FFW
45	EGSDC3045FFG	EGSDC3045FFW
50	EGSDC3050FFG	EGSDC3050FFW
60	EGSDC3060FFG	EGSDC3060FFW
70	EGSDC3070FFG	EGSDC3070FFW
80	EGSDC3080FFG	EGSDC3080FFW
90	EGSDC3090FFG	EGSDC3090FFW
100	EGSDC3100FFG	EGSDC3100FFW



## HFDDC


**Type HFDDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 42 kAIC at 600 Vdc**

Maximum Continuous Ampere Rating at 40°C	Complete Circuit Breaker with Line and Load Terminals ①			
	Single-Pole Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
15	HFDDC1015L	HFDDC2015L	HFDDC3015L	HFDDC4015L
20	HFDDC1020L	HFDDC2020L	HFDDC3020L	HFDDC4020L
25	HFDDC1025L	HFDDC2025L	HFDDC3025L	HFDDC4025L
30	HFDDC1030L	HFDDC2030L	HFDDC3030L	HFDDC4030L
35	HFDDC1035L	HFDDC2035L	HFDDC3035L	HFDDC4035L
40	HFDDC1040L	HFDDC2040L	HFDDC3040L	HFDDC4040L
45	HFDDC1045L	HFDDC2045L	HFDDC3045L	HFDDC4045L
50	HFDDC1050L	HFDDC2050L	HFDDC3050L	HFDDC4050L
60	HFDDC1060L	HFDDC2060L	HFDDC3060L	HFDDC4060L
70	HFDDC1070L	HFDDC2070L	HFDDC3070L	HFDDC4070L
80	HFDDC1080L	HFDDC2080L	HFDDC3080L	HFDDC4080L
90	HFDDC1090L	HFDDC2090L	HFDDC3090L	HFDDC4090L
100	HFDDC1100L	HFDDC2100L	HFDDC3100L	HFDDC4100L
110	HFDDC1110L	HFDDC2110L	HFDDC3110L	HFDDC4110L
125	HFDDC1125L	HFDDC2125L	HFDDC3125L	HFDDC4125L
150	HFDDC1150L	HFDDC2150L	HFDDC3150L	HFDDC4150L
175	—	HFDDC2175L	HFDDC3175L	—
200	—	HFDDC2200L	HFDDC3200L	—
225	—	HFDDC2225L	HFDDC3225L	—

**Type JGEDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 35 kAIC at 600 Vdc**

Maximum Continuous Ampere Rating at 40°C	Complete Breaker Catalog Number	Circuit Breaker Frame Only ② Catalog Number	Thermal-Magnetic Trip Unit Catalog Number	Standard Terminals Catalog Number
	70	JGEDC3070FAG	JGEDC3250NN	JT3070FA
90	JGEDC3090FAG	JGEDC3250NN	JT3090FA	T250FJ
100	JGEDC3100FAG	JGEDC3250NN	JT3100FA	T250FJ
125	JGEDC3125FAG	JGEDC3250NN	JT3125FA	T250FJ
150	JGEDC3150FAG	JGEDC3250NN	JT3150FA	T250FJ
175	JGEDC3175FAG	JGEDC3250NN	JT3175FA	T250FJ
200	JGEDC3200FAG	JGEDC3250NN	JT3200FA	T250FJ
225	JGEDC3225FAG	JGEDC3250NN	JT3225FA	T250FJ
250	JGEDC3250FAG	JGEDC3250NN	JT3250FA	T250FJ

**Notes**

- ① For breaker without terminals, replace "L" with "W" at end of catalog number.  
 ② For complete breaker, order individual frame, trip unit and terminals for field installation.

**Type JGSDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 50 kAIC at 600 Vdc**

Maximum Continuous Ampere Rating at 40°C	Complete Breaker Catalog Number	Circuit Breaker Frame Only <sup>①</sup> Catalog Number	Thermal-Magnetic Trip Unit Catalog Number	Standard Terminals Catalog Number
70	JGSDC3070FAG	JGSDC3250NN	JT3070FA	T250FJ
90	JGSDC3090FAG	JGSDC3250NN	JT3090FA	T250FJ
100	JGSDC3100FAG	JGSDC3250NN	JT3100FA	T250FJ
125	JGSDC3125FAG	JGSDC3250NN	JT3125FA	T250FJ
150	JGSDC3150FAG	JGSDC3250NN	JT3150FA	T250FJ
175	JGSDC3175FAG	JGSDC3250NN	JT3175FA	T250FJ
200	JGSDC3200FAG	JGSDC3250NN	JT3200FA	T250FJ
225	JGSDC3225FAG	JGSDC3250NN	JT3225FA	T250FJ
250	JGSDC3250FAG	JGSDC3250NN	JT3250FA	T250FJ

JGHDC3250NN



**Type JGHDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 65 kAIC at 600 Vdc**

Maximum Continuous Ampere Rating at 40°C	Complete Breaker Catalog Number	Circuit Breaker Frame Only <sup>①</sup> Catalog Number	Thermal-Magnetic Trip Unit Catalog Number	Standard Terminals Catalog Number
70	JGHDC3070FAG	JGHDC3250NN	JT3070FA	T250FJ
90	JGHDC3090FAG	JGHDC3250NN	JT3090FA	T250FJ
100	JGHDC3100FAG	JGHDC3250NN	JT3100FA	T250FJ
125	JGHDC3125FAG	JGHDC3250NN	JT3125FA	T250FJ
150	JGHDC3150FAG	JGHDC3250NN	JT3150FA	T250FJ
175	JGHDC3175FAG	JGHDC3250NN	JT3175FA	T250FJ
200	JGHDC3200FAG	JGHDC3250NN	JT3200FA	T250FJ
225	JGHDC3225FAG	JGHDC3250NN	JT3225FA	T250FJ
250	JGHDC3250FAG	JGHDC3250NN	JT3250FA	T250FJ

HJDDC3250



**Type HJDDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 42 kAIC at 600 Vdc**

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only <sup>①</sup> Catalog Number	Thermal-Magnetic Trip Unit Catalog Number	Standard Terminals Catalog Number
70	HJDDC3250F	JT3070T	TA250KB
90	HJDDC3250F	JT3090T	TA250KB
100	HJDDC3250F	JT3100T	TA250KB
125	HJDDC3250F	JT3125T	TA250KB
150	HJDDC3250F	JT3150T	TA250KB
175	HJDDC3250F	JT3175T	TA250KB
200	HJDDC3250F	JT3200T	TA250KB
225	HJDDC3250F	JT3225T	TA250KB
250	HJDDC3250F	JT3250T	TA250KB

**Note**

<sup>①</sup> For complete breaker, order individual frame, trip unit and terminals for field installation.

## HKDDC3400


**Type HKDDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 42 kAIC at 600 Vdc**

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only <sup>①</sup> Catalog Number	Thermal-Magnetic Trip Unit Catalog Number	Standard Terminals Catalog Number
100	HKDDC3400F	KT3100T	TA300K
125	HKDDC3400F	KT3125T	TA300K
150	HKDDC3400F	KT3150T	TA300K
175	HKDDC3400F	KT3175T	TA300K
200	HKDDC3400F	KT3200T	TA300K
225	HKDDC3400F	KT3225T	TA300K
250	HKDDC3400F	KT3250T	TA350K
300	HKDDC3400F	KT3300T	TA350K
350	HKDDC3400F	KT3350T	TA350K
400	HKDDC3400F	KT3400T	3TA400K <sup>②</sup>

## LGEDC3630NN


**Type LGEDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 35 kAIC at 600 Vdc**

Maximum Continuous Ampere Rating at 40°C	Complete Breaker Catalog Number	Circuit Breaker Frame Only <sup>①</sup> Catalog Number	Thermal-Magnetic Trip Unit Catalog Number	Standard Terminals Catalog Number
250	LGEDC3250FAG	LGEDC3630NN	LT3250FA	TA350LK
300	LGEDC3300FAG	LGEDC3630NN	LT3300FA	TA350LK
350	LGEDC3350FAG	LGEDC3630NN	LT3350FA	TA350LK
400	LGEDC3400FAG	LGEDC3630NN	LT3400FA	TA350LK
500	LGEDC3500FAG	LGEDC3630NN	LT4500FA	3TA632LK <sup>②</sup>
600	LGEDC3600FAG	LGEDC3630NN	LT3600FA	3TA632LK <sup>②</sup>

**Type LGSDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 50 kAIC at 600 Vdc**

Maximum Continuous Ampere Rating at 40°C	Complete Breaker Catalog Number	Circuit Breaker Frame Only <sup>①</sup> Catalog Number	Thermal-Magnetic Trip Unit Catalog Number	Standard Terminals Catalog Number
250	LGSDC3250FAG	LGSDC3630NN	LT3250FA	TA350LK
300	LGSDC3300FAG	LGSDC3630NN	LT3300FA	TA350LK
350	LGSDC3350FAG	LGSDC3630NN	LT3350FA	TA350LK
400	LGSDC3400FAG	LGSDC3630NN	LT3400FA	TA350LK
500	LGSDC3500FAG	LGSDC3630NN	LT4500FA	3TA632LK <sup>②</sup>
600	LGSDC3600FAG	LGSDC3630NN	LT3600FA	3TA632LK <sup>②</sup>

**Notes**

- <sup>①</sup> For complete breaker, order individual frame, trip unit and terminals for field installation.  
<sup>②</sup> Three-pole kit.

**Type LGHDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 65 kAIC at 600 Vdc**

Maximum Continuous Ampere Rating at 40°C	Complete Breaker Catalog Number	Circuit Breaker Frame Only <sup>①</sup> Catalog Number	Thermal-Magnetic Trip Unit Catalog Number	Standard Terminals Catalog Number
250	LGHDC3250FAG	LGHDC3630NN	LT3250FA	TA350LK
300	LGHDC3300FAG	LGHDC3630NN	LT3300FA	TA350LK
350	LGHDC3350FAG	LGHDC3630NN	LT3350FA	TA350LK
400	LGHDC3400FAG	LGHDC3630NN	LT3400FA	TA350LK
500	LGHDC3500FAG	LGHDC3630NN	LT4500FA	3TA632LK <sup>②</sup>
600	LGHDC3600FAG	LGHDC3630NN	LT3600FA	3TA632LK <sup>②</sup>

**HLDDC**



**Type HLDDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 35 kAIC at 600 Vdc**

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only <sup>①</sup> Catalog Number	Thermal-Magnetic Trip Unit Catalog Number	Standard Terminals Catalog Number
300	HLDDC3600F	LT3300T	TA602LD
350	HLDDC3600F	LT3350T	TA602LD
400	HLDDC3600F	LT3400T	TA602LD
450	HLDDC3600F	LT3450T	TA602LD
500	HLDDC3600F	LT3500T	TA602LD
600	HLDDC3600F	LT3600T	3TA603LDK <sup>②</sup>

**Type HLDDC DC Circuit Breakers—  
Two-Pole High Interrupting Capacity 50 kAIC at 250 Vdc <sup>③④</sup>**

Maximum Continuous Ampere Rating at 40°C	Complete Breaker Catalog Number
600	HLDDC20600
700	HLDDC20700
800	HLDDC20800
900	HLDDC20900
1000	HLDDC21000
1200	HLDDC21200

**Notes**

- ① For complete breaker, order individual frame, trip unit and terminals for field installation.
- ② Three-pole kit.
- ③ Includes breaker frame, trip unit and terminals.
- ④ Four-pole breaker with two poles wired in parallel.

HMDLDC3800F



#### Type HMDLDC DC Circuit Breakers— Three-Pole High Interrupting Capacity 35 kAIC at 600 Vdc

Maximum Continuous Ampere Rating at 40°C	Circuit Breaker Frame Only <sup>①</sup> Catalog Number	Thermal-Magnetic Trip Unit Catalog Number	Standard Terminals Catalog Number
300	HMDLDC3800F	MT3300T	TA700MA1
350	HMDLDC3800F	MT3350T	TA700MA1
400	HMDLDC3800F	MT3400T	TA700MA1
450	HMDLDC3800F	MT3450T	TA700MA1
500	HMDLDC3800F	MT3500T	TA700MA1
600	HMDLDC3800F	MT3600T	TA700MA1
700	HMDLDC3800F	MT3700T	TA700MA1
800	HMDLDC3800F	MT3800T	TA800MA2

#### Type NBDC DC Circuit Breakers— Three-Pole High Interrupting Capacity 50 kAIC at 600 Vdc

Maximum Continuous Ampere Rating at 40°C	Complete Circuit Breaker Factory Assembled without Terminals <sup>②</sup> Catalog Number	Includes Magnetic Trip Unit Calibrated at 135%	Standard Terminals Catalog Number
700	NBDC3700MW	Included	TA1000NB1
800	NBDC3800MW	Included	TA1000NB1
900	NBDC3900MW	Included	TA1000NB1
1000	NBDC31000MW	Included	TA1000NB1
1200	NBDC31200MW	Included	TA1200NB1

#### Type RGHDC DC Circuit Breakers— Three-Pole High Interrupting Capacity 65 kAIC at 600 Vdc

Maximum Continuous Ampere Rating at 40°C	Complete Circuit Breaker Factory Assembled without Terminals <sup>②</sup> Catalog Number	Includes Magnetic Trip Unit Calibrated at 135%	Standard Rear Connectors Catalog Number
1600	RGHDC31600FFW	Included	B2016RDM
2000	RGHDC32000FFW	Included	B2016RDM
2500	RGDC32500FFW	Included	B2500RDM
3000	RGHDC33000FFW	Included	B3000RDM

**Notes**

- ① Includes frame and trip unit. Order terminals or connectors separately.
- ② For complete breaker, order individual frame, trip unit and terminals for field installation.

## DC Breaker Terminal Wire Ranges

Breaker Frame	Maximum Breaker Ampacity	Terminal Body Material	Wire Type	AWG Wire Range/ Number of Conductors	Metric Wire Range mm <sup>2</sup>	Number of Terminals Included	Standard Terminal Catalog Number
EGEDC, EGSDC, EGHDC	100	Aluminum	Cu/Al	14–1/0	2.5–50	3	3TA125EF
HFDDC	20	Steel	Cu/Al	14–10 (1)	2.5–4 (1)	3	3T20FB
	100	Steel	Cu/Al	14–1/0 (1)	2.5–50 (1)	3	3T100FB
	225	Aluminum	Cu/Al	4–4/0 (1)	25–95 (1)	3	3TA225FD
JGEDC, JGSDC, JGHDC	250	Stainless steel	Cu	4–350 (1)	25–185 (1)	1	T250FJ
HJDDC	250	Aluminum	Cu/Al	4–350 kcmil (1)	25–185 (1)	1	TA250KB
HKDDC	225	Aluminum	Cu/Al	3–350 kcmil (1)	35–185 (1)	1	TA300K
	350	Aluminum	Cu/Al	250–500 kcmil (1)	120–240 (1)	1	TA350K
	400	Aluminum	Cu/Al	3/0–250 kcmil (2)	95–120 (1)	3	3TA400K
LGEDC, LGSDC, LGHDC	400	Aluminum	Cu/Al	2–500 (1)	35–240 (1)	1	TA350LK
	630	Aluminum	Cu/Al	2–500 kcmil (2)	35–240 (2)	1	TA632L
	630	Aluminum	Cu/Al	2–500 kcmil (2)	35–240 (2)	3	3TA632LK
HLDDC	500	Aluminum	Cu/Al	3/0–350 kcmil (2)	95–150 (2)	1	TA602LD
	600	Aluminum	Cu/Al	400–500 kcmil (2)	185–240 (2)	3	3TA603LDK
HMDLDC	600	Aluminum	Cu/Al	1–500 kcmil (2)	—	1	TA700MA1
	800	Aluminum	Cu/Al	3/0–400 kcmil (3)	—	1	TA800MA2
NBDC	700	Aluminum	Cu/Al	3/0–400 kcmil (3)	95–185 (3)	1	TA1000NB1
	800	Aluminum	Cu/Al	3/0–400 kcmil (3)	95–185 (3)	1	TA1000NB1
	900	Aluminum	Cu/Al	3/0–400 kcmil (3)	95–185 (3)	1	TA1000NB1
	1000	Aluminum	Cu/Al	3/0–400 kcmil (3)	95–185 (3)	1	TA1000NB1
	1200	Aluminum	Cu/Al	4/0–500 kcmil (4)	120–240 (4)	1	TA1200NB1
RGHDC	1600	Aluminum	Cu/Al	500–1000 (4)	300–500	1	TA1600RDM
	1600	Copper	Cu	1–600 (4)	50–300	1	T1600RDM
	2000	Aluminum	Cu/Al	2–600 (6)	35–300	3	TA2000RDM
	3000	TBD					

## Molded Case Switches

Eaton's DC molded case switches are used in applications requiring a compact, high-capacity disconnect. They are UL 489 listed and have automatic high instantaneous current protection. These devices do not provide overload protection.

## Molded Case Switches

Maximum Continuous Ampere Rating at 40°C	Interrupting Capacity (Volts DC)	Poles in Series	With Line and Load Terminals		Without Line and Load Terminals	
			Catalog Number	Catalog Number	Catalog Number	Catalog Number
<b>600 Vdc Maximum</b>						
100	42	3	HFDDC3100KL		HFDDC3100KW	
150	42	3	HFDDC3150KL		HFDDC3150KW	
225	42	3	HFDDC3225KL		HFDDC3225KW	
250	65	3	JGKDC3250KSG		JGKDC3250KSW	
250	42	3	HJDDC3250K		HJDDC3250KW	
			400	35	3	HKDDC3400K
600	65	3	LGKDC3400KSG			
			800	35	3	LGKDC3630KSG
800	35	3				HLDDC3600K
			800	35	3	HMDLDC3800K
<b>500 Vdc Maximum</b>						
100	65	3	EGK3100KSG		EGK3100KSW	
<b>250 Vdc Maximum</b>						
100	50	2	HFDDC2100KL		HFDDC2100KW	
150	50	2	HFDDC2150KL		HFDDC2150KW	
225	50	2	HFDDC2225KL		HFDDC2225KW	
1200	50	①	HLDDC21200K ①		HLDDC21200WK ①	

## Note

① Four-pole frame with two-pole connected in parallel.

# 2.6

## Molded Case Circuit Breakers

### Specialty Breakers

#### Accessories

#### Internal Accessories

#### Field Installation Kits

Description	Factory Installation (HFDDC)	HFDDC ①	EGEDC, EGSDC, EGHDC	JGEDC, JGSDC, JGHDC	LGEDC, LGSDC, LGHDC	HJDDC	HKDDC	HLDDC	HMDLDC	NBDC	RGHDC
<b>Right-Pole Mounting</b>											
Auxiliary switch											
1A-1B	A06	A1X1PK	AUX1A1BPK	AUX1A1BPK	A1X2PK	A1X3PK	A1X4PK	A1X4PK	A1X4PK	4980D16G05	—
2A-2B	A13	A2X1RPK	AUX2A2BPK	AUX2A2BPK	A2X2PK	A2X3PK	A2X4PK	A2X4PK	A2X4PK	4980D16G06	A2X6RPK
Alarm switch											
1 make/1 break	B06	A1L1RPK	ALM1M1BEPK	ALM1M1BJPK	A1L2RPK	A1L3RPK	A1L4RPK	A1L4RPK	A1L4RPK	—	A1L6RPK
Auxiliary and alarm combo											
1A-1B, 1 make/1 break	C05	AAL1RPK	AUXALRMEPK	AUXALRMJPK	AAL2RPK	AAL3RPK	AA114RPK	AA114RPK	AA114RPK	—	A2L6RPK
<b>Left-Pole Mounting</b>											
Shunt trip											
12 Vdc	S02	SNT1LP03K	SNT012CPK	SNT012CPK	SNT2P04K	SNT3P04K	SNT4LP03K	SNT4LP03K	SNT4LP03K	2606D58G14	—
24 Vdc	S02	SNT1LP03K	SNT060CPK	SNT060CPK	SNT2P04K	SNT3P04K	SNT4LP03K	SNT4LP03K	SNT4LP03K	2606D58G13	SNT6P03K ②
48 Vdc	S06	SNT1LP08K	SNT060CPK	SNT060CPK	SNT2P06K	SNT3P06K	SNT4LP23K	SNT4LP23K	SNT4LP23K	2606D58G12	SNT6P23K ②
60 Vdc	S06	SNT1LP08K	SNT060CPK	SNT060CPK	SNT2P06K	SNT3P06K	SNT4LP23K	SNT4LP23K	SNT4LP23K	2606D58G11	SNT6P23K ②
125 Vdc	S10	SNT1LP12K	SNT120CPK	SNT120CPK	SNT2P11K	SNT3P11K	SNT4LP26K	SNT4LP26K	SNT4LP26K	2606D58G10	SNT6P23K ②
250 Vdc	S14	SNT1LP18K	—	—	SNT2P14K	SNT3P14K	SNT4LP14K	SNT4LP14K	SNT4LP14K	2606D58G09	SNT6P14K
120 Vac	S06	SNT1LP12K	SNT120CPK	SNT120CPK	SNT2P11K	SNT3P11K	SNT4LP11K	SNT4LP11K	SNT4LP11K	2060D58G05	SNT6P11K ②
Undervoltage release											
12 Vdc	U30	UVH1LP20K	UVR012DPK	UVR012DPK	UVH2LP20K	UVH3LP20K	UVH4LP20K	UVH4LP20K	UVH4LP20K	372D032G06	UVH6RP20K ②
24 Vdc	U34	UVH1LP21K	UVR024DPK	UVR024DPK	UVH2LP21K	UVH3LP21K	UVH4LP21K	UVH4LP21K	UVH4LP21K	372D032G07	UVH6RP21K ②
48 Vdc	U38	UVH1LP22K	UVR048DPK	UVR048DPK	UVH2LP22K	UVH3LP22K	UVH4LP22K	UVH4LP22K	UVH4LP22K	372D032G08	UVH6RP23K ②
125 Vdc	U42	UVH1LP26K	UVR125DPK	UVR125DPK	UVH2LP26K	UVH3LP26K	UVH4LP26K	UVH4LP26K	UVH4LP26K	372D032G09	UVH6RP26K ②
250 Vdc	U46	UVH1LP28K	UVR250DPK	UVR250DPK	UVH2LP28K	UVH3LP28K	UVH4LP28K	UVH4LP28K	UVH4LP28K	372D032G10	UVH6RP28K ②
120 Vac	U14	UVH1LP08K	UVR120APK	UVR120APK	UVH2LP08K	UVH3LP08K	UVH4LP08K	UVH4LP08K	UVH4LP08K	373D632G05	UVH6RP08K ②

#### Notes

① F-Frame circuit breakers are factory sealed. Underwriters Laboratories requires that internal accessories be installed at the factory. Internal accessories are UL listed for factory installation under E7819. Where local codes and standards permit and UL listing is not required, internal accessories can be field installed. Accessory installation should be done before the circuit breaker is mounted and connected.

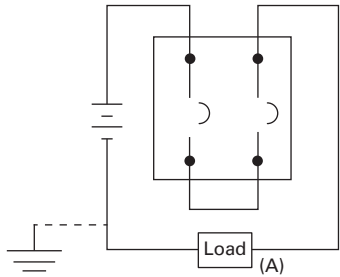
② Right-pole mounted.

One accessory can be mounted per pole, per breaker. Factory installation of accessories is available. Contact Eaton for assistance with part number configuration.

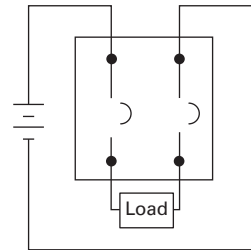
**Wiring Diagrams**

**Series Connection Diagrams for DC Application ①②**

**250 Vdc Maximum—Two Poles in Series**

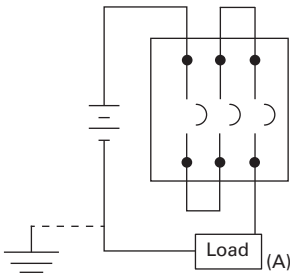


Suitable for use on ungrounded systems, or grounded systems that have one end of load (A) connected to grounded terminal, opposite poles in series connection.

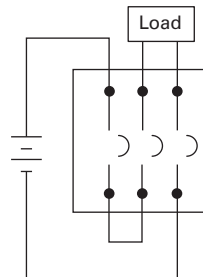


Suitable for use on ungrounded systems only.

**500 Vdc or 600 Vdc Maximum—Three Poles in Series**

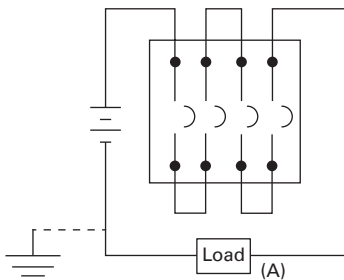


Suitable for use on ungrounded systems, or grounded systems that have one end of load (A) connected to grounded terminal, opposite poles in series connection.

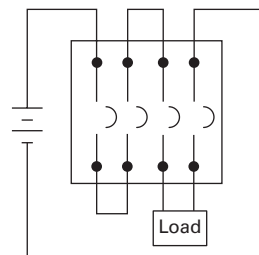


Suitable for use on ungrounded systems only.

**750 Vdc Maximum—Four Poles in Series**



Suitable for use on ungrounded systems, or grounded systems that have one end of load (A) connected to grounded terminal, opposite poles in series connection.



Suitable for use on ungrounded systems only.

**Notes**

- ① Poles in series connection is customer supplied. Use rated cable per NEC.
- ② For grounded systems, all poles in series must be connected on non-grounded terminal, with load connected to grounded terminal.



# 2.6

## Molded Case Circuit Breakers

### Specialty Breakers

#### Dimensions

Approximate Dimensions in Inches (mm)

2

#### DC Breaker Dimensions

Frame	Number of Poles	Width	Height	Depth
EGEDC, EGSDC, EGHDC	3	3.00 (76.2)	5.50 (139.7)	2.99 (75.9)
HFDDC	1	1.38 (35.1)	6.00 (152.4)	3.38 (86.0)
	2	2.75 (70.0)	6.00 (152.4)	3.38 (86.0)
	3	4.13 (105.0)	6.00 (152.4)	3.38 (86.0)
	4	5.50 (139.7)	6.00 (152.4)	3.38 (86.0)
JGEDC, JGSDC, JGHDC	3	4.13 (104.9)	7.00 (177.8)	3.57 (90.7)
HJDDC	2, 3	4.13 (105.0)	10.00 (254.0)	4.06 (103.1)
HKDDC	2, 3	5.50 (139.7)	10.13 (257.3)	4.10 (104.1)
LGEDC, LGSDC, LGHDC	3	5.48 (139.2)	10.13 (257.3)	4.09 (103.9)
600A Max. HLDDC	2, 3	8.25 (209.6)	10.75 (273.1)	4.06 (103.1)
1200A Max. HLDDC	4	11.00 (279.4)	10.75 (273.1)	4.06 (103.1)
HMDLDC	2, 3	8.25 (209.6)	16.00 (406.4)	4.06 (103.1)
NBDC	3	8.25 (209.6)	16.00 (406.4)	5.50 (139.7)
RGHDC	3	15.50 (393.7)	16.00 (406.4)	9.75 (247.7)

**PVGard Solar Photovoltaic Circuit Breakers**



600 Vdc Per-Pole

1000 Vdc Poles-in-Series

**Contents**

**Description**

Engine Generator Circuit Breakers . . . . .	<b>V4-T2-336</b>
Direct Current Circuit Breakers . . . . .	<b>V4-T2-342</b>
PVGard Solar Circuit Breakers—600 Vdc Per-Pole and 1000 Vdc Poles-in-Series	
Application Description . . . . .	<b>V4-T2-356</b>
Features . . . . .	<b>V4-T2-356</b>
Standards and Certifications . . . . .	<b>V4-T2-356</b>
Product Selection . . . . .	<b>V4-T2-357</b>
Accessories . . . . .	<b>V4-T2-359</b>
Technical Data and Specifications . . . . .	<b>V4-T2-362</b>
Dimensions . . . . .	<b>V4-T2-365</b>
Wiring Diagrams . . . . .	<b>V4-T2-366</b>
E <sup>2</sup> Mining Service Circuit Breakers . . . . .	<b>V4-T2-367</b>
Classic Mining Breakers . . . . .	<b>V4-T2-390</b>
Add-On Ground Fault Protection—Type GFR . . . . .	<b>V4-T2-404</b>

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Page

**PVGard Solar Circuit Breakers—600 Vdc Per-Pole and 1000 Vdc Poles-in-Series**

**Product Overview**

- Two PVGard lineups
  - 600 Vdc per-pole breaker and switch. Each pole rated 600 Vdc
  - 1000 Vdc poles-in-series breaker and switch. Requires poles in series connection
- Both options UL 489B listed for solar photovoltaic circuit protection
- 50°C calibration
- Offers both 100% and 80% rated breakers
- Handle bi-directional current flow

**Product Description**

Photovoltaic (PV) systems convert the energy of the sun into electrical power that is fed directly into the electric grid. Within the balance of system (BOS), direct current (DC) circuit breakers protect the wiring connected from the PV modules to the combiner or the inverter, while also behaving as a disconnect.

Eaton is a global leader in circuit protection and brings this expertise to bear in the photovoltaic market. PVGard solar circuit breakers are part of a product family that combines a disconnect with circuit protection in a single, compact, resettable device to protect and isolate DC circuits as needed in photovoltaic systems. PVGard breakers can replace fuses, fuse holders and disconnects in combiner box and inverter applications—saving space, streamlining design, purchasing and receiving, and reducing spare parts requirements.

There are two PVGard lineups to choose from: the industry-exclusive, 600 Vdc per-pole breakers and switches designed for residential and light commercial applications and 1000 Vdc poles-in-series breakers and switches for commercial and utility scale applications.

**PVGard 600 Vdc Per-Pole Lineup**

Only Eaton can offer this breakthrough breaker that will save significant space, time and cost. As a single-circuit-per-pole device, it allows space savings of up to 66% when compared to traditional poles-in-series disconnects, switches and breakers. In addition, it eliminates the need for jumpers for poles-in-series connection—saving on installation time, labor and even inventory.

**PVGard 1000 Vdc Poles-in-Series Lineup**

This 1000 Vdc poles-in-series lineup provides reliable and safe disconnect means and overcurrent protection in a single, compact device for commercial and utility scale PV systems. This solution does not require jumpers with the breaker/switch to be a UL 489B listed device, providing reliability and flexibility in design without limitation on implementation of the breaker/switch. If needed, cost-effective Eaton jumpers can be included.

**Application Description**

Photovoltaic (PV) systems convert the energy of the sun into electrical power that is fed directly into the electric grid. PVGuard circuit breakers are used to protect the wiring from the modules to the combiner box or inverter from overcurrents, and to provide an isolation mechanism.

Eaton offers a complete line of UL 489 Listed multi-purpose 600 Vdc poles-in-series breakers and switches, as well as protection for the AC side of the inverter. Refer to **Page V4-T2-342** for 600 Vdc breakers and **Page V4-T2-6** for AC breaker selection.

**Features**

PVGuard breakers are uniquely designed with these features:

- Meets the higher voltage and lower fault current levels of solar systems
- Tested to extreme ambient conditions from  $-40^{\circ}\text{C}$  to  $+90^{\circ}\text{C}$
- Full complement of accessories for status, signalling, and on/off operation remotely
- Can handle bi-directional flow of current
- Can be applied in grounded, ungrounded or bi-polar systems
- Meets and exceeds the standards of UL 489B for photovoltaic molded case circuit breakers and molded case switches
- Available both standard (80%-rated) and 100%-rated breakers
- $50^{\circ}\text{C}$  calibration
- Ability to open on signal from DC arc or ground fault detector
- Wide range of current ratings increases options for matching incoming strings
- Eliminates fuse stocking costs and matching issues

Designed specifically for high- and low-temperature demands of PV installations, PVGuard circuit breakers undergo extreme ambient cycling tests, and carry a robust operating temperature range. Trip units calibrate at 100% and 80% of nameplate current in a  $50^{\circ}\text{C}$  ambient, ensuring continuous operation in higher temperature environments typical to solar.

Rigorous third-party testing includes limited and standard fault current tests, electrical and mechanical endurance, di-electric voltage withstand and temperature tests. Eaton's PVGuard products are stand-alone devices without requiring jumpers to be UL 489B listed devices.

PVGuard breakers are available with a full complement of accessories to provide string status, enable remote trip, on/off operation, and can be customized to site requirements.

**Standards and Certifications**

- Designed to meet UL 489B for solar photovoltaic circuit protection
- UL File E350638, Category Control Number DIUR



### Product Selection

Catalog number includes breaker frame and trip unit. Order terminals separately. See **Page V4-T2-361**. For complete internal and external accessories, see accessory section of each frame.

#### FD PVS Frame



#### FD PVS Frame, 100A Maximum, 600 Vdc Per Pole, 1.2 kA <sup>Ⓢ</sup> (soon to be released)

Current Rating Amperes	Number Poles/ 600 Vdc Circuits	Trip Unit	80% Rated Catalog Number	100% Rated Catalog Number
30	1, 2	Fixed thermal, fixed magnetic	FDPVS1030W	CFDPVS1030W
40	1, 2	Fixed thermal, fixed magnetic	FDPVS1040W	CFDPVS1040W
50	1, 2	Fixed thermal, fixed magnetic	FDPVS1050W	CFDPVS1050W
60	1, 2	Fixed thermal, fixed magnetic	FDPVS1060W	CFDPVS1060W
70	1, 2	Fixed thermal, fixed magnetic	FDPVS1070W	CFDPVS1070W
80	1, 2	Fixed thermal, fixed magnetic	FDPVS1080W	CFDPVS1080W
90	1, 2	Fixed thermal, fixed magnetic	FDPVS1090W	CFDPVS1090W
100	1, 2	Fixed thermal, fixed magnetic	FDPVS1100W	CFDPVS1100W

#### JG PVS Frame



#### JG PVS Frame, 250A Maximum, 600 Vdc Per Pole, 1.2 kA <sup>Ⓢ</sup>

Current Rating Amperes	Number Poles/ 600 Vdc Circuits	Trip Unit	80% Rated Catalog Number	100% Rated Catalog Number
90	3	Fixed thermal, fixed magnetic	JGPVS3090W	CJGPVS3090W
100	3	Fixed thermal, fixed magnetic	JGPVS3100W	CJGPVS3100W
125	3	Fixed thermal, fixed magnetic	JGPVS3125W	CJGPVS3125W
150	3	Fixed thermal, fixed magnetic	JGPVS3150W	CJGPVS3150W
175	3	Fixed thermal, fixed magnetic	JGPVS3175W	CJGPVS3175W
200	3	Fixed thermal, fixed magnetic	JGPVS3200W	CJGPVS3200W
225	3	Fixed thermal, fixed magnetic	JGPVS3225W	CJGPVS3225W
250	3	Fixed thermal, fixed magnetic	JGPVS3250W	CJGPVS3250W

#### KD PVS Frame



#### KD PVS Frame, 400A Maximum, 600 Vdc Per Pole, 3 kA <sup>Ⓢ</sup>

Current Rating Amperes	Number Poles/ 600 Vdc Circuits	Trip Unit	80% Rated Catalog Number	100% Rated Catalog Number
100	3	Fixed thermal, fixed magnetic	KDPVS3100W	CKDPVS3100W
125	3	Fixed thermal, fixed magnetic	KDPVS3125W	CKDPVS3125W
150	3	Fixed thermal, fixed magnetic	KDPVS3150W	CKDPVS3150W
175	3	Fixed thermal, fixed magnetic	KDPVS3175W	CKDPVS3175W
200	3	Fixed thermal, fixed magnetic	KDPVS3200W	CKDPVS3200W
225	3	Fixed thermal, fixed magnetic	KDPVS3225W	CKDPVS3225W
250	3	Fixed thermal, fixed magnetic	KDPVS3250W	CKDPVS3250W
300	3	Fixed thermal, fixed magnetic	KDPVS3300W	CKDPVS3300W
350	3	Fixed thermal, fixed magnetic	KDPVS3350W	CKDPVS3350W
400	3	Fixed thermal, fixed magnetic	KDPVS3400W	CKDPVS3400W

**Note**

<sup>Ⓢ</sup> Terminals not included with frames.

# 2.6

## Molded Case Circuit Breakers

### Specialty Breakers

Catalog number includes breaker frame and trip unit. Order terminals separately. See **Page V4-T2-361**.

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#### FD PV Frame



#### FD PV Frame, 100A Maximum, 1000 Vdc, 3 kA ①

Current Rating Amperes	Poles in Series	Trip Unit	80% Rated Catalog Number	100% Rated Catalog Number
30	4	Fixed thermal, fixed magnetic	FDPV4030W	CFDPV4030W
40	4	Fixed thermal, fixed magnetic	FDPV4040W	CFDPV4040W
50	4	Fixed thermal, fixed magnetic	FDPV4050W	CFDPV4050W
60	4	Fixed thermal, fixed magnetic	FDPV4060W	CFDPV4060W
70	4	Fixed thermal, fixed magnetic	FDPV4070W	CFDPV4070W
80	4	Fixed thermal, fixed magnetic	FDPV4080W	CFDPV4080W
90	4	Fixed thermal, fixed magnetic	FDPV4090W	CFDPV4090W
100	4	Fixed thermal, fixed magnetic	FDPV4100W	CFDPV4100W

#### KD PV Frame



#### KD PV Frame, 250A Maximum, 1000 Vdc, 5 kA ①

Current Rating Amperes	Poles in Series	Trip Unit	80% Rated Catalog Number	100% Rated Catalog Number
125	4	Fixed thermal, fixed magnetic	KDPV4125W	CKDPV4125W
150	4	Fixed thermal, fixed magnetic	KDPV4150W	CKDPV4150W
175	4	Fixed thermal, fixed magnetic	KDPV4175W	CKDPV4175W
200	4	Fixed thermal, fixed magnetic	KDPV4200W	CKDPV4200W
225	4	Fixed thermal, fixed magnetic	KDPV4225W	CKDPV4225W
250	4	Fixed thermal, fixed magnetic	KDPV4250W	CKDPV4250W
300	4	Fixed thermal, fixed magnetic	KDPV4300W	CKDPV4300W
350	4	Fixed thermal, fixed magnetic	KDPV4350W	CKDPV4350W

#### LG PV Frame



#### LG PV Frame, 400A Maximum, 1000 Vdc, 5 kA ①

Current Rating Amperes	Poles in Series	Trip Unit	80% Rated Catalog Number	100% Rated Catalog Number
250	4	Fixed thermal, fixed magnetic	LGPV4250FFW	CLGPV4250FFW
300	4	Fixed thermal, fixed magnetic	LGPV4300FFW	CLGPV4300FFW
350	4	Fixed thermal, fixed magnetic	LGPV4350FFW	CLGPV4350FFW
400	4	Fixed thermal, fixed magnetic	LGPV4400FFW	CLGPV4400FFW

#### MDL PV Frame



#### MDL PV Frame, 600A Maximum, 1000 Vdc, 7.5 kA ①

Current Rating Amperes	Poles in Series	Trip Unit	80% Rated Catalog Number	100% Rated Catalog Number
300	3	Fixed thermal, fixed magnetic	MDLPV3300W	CMDLPV3300W
350	3	Fixed thermal, fixed magnetic	MDLPV3350W	CMDLPV3350W
400	3	Fixed thermal, fixed magnetic	MDLPV3400W	CMDLPV3400W
450	3	Fixed thermal, fixed magnetic	MDLPV3450W	CMDLPV3450W
500	3	Fixed thermal, fixed magnetic	MDLPV3500W	CMDLPV3500W
600	3	Fixed thermal, fixed magnetic	MDLPV3600W	CMDLPV3600W

**Note**

① Terminals not included with frames.

**Accessories**

**Available accessories**

- Auxiliary switch
- Shunt trip
- Electrical operator
- Alarm lockout
- Undervoltage release
- Terminals
- Lock-off devices
- End cap kits
- Rotary handle mechanisms
- Flexible shaft handle mechanisms

**Optional modifications**

- Freeze testing

For complete internal and external accessories, see the accessory section of each frame.

**External Accessories**

Description	Frame	Catalog Number
<b>Imperial Base Mounting Hardware</b>		
0.164-32 x 1.5-inch pan-head steel screws and lockwashers	FD PV FD PVS	<b>BMH1</b>
0.250-20 x 1.5 inch pan-head steel screws and lockwashers	KD PV KD PVS	<b>BMH3</b>
—	JG PVS	N/A
—	LG PV	N/A
0.3125-18 x 1.25 inch filister-head steel screws and lockwashers and flat washers	MDL PV	<b>BMH5</b>
<b>Metric Base Mounting Hardware</b>		
M4-0.7 x 38 mm pan-head steel screws and lockwashers	FD PV FD PVS	<b>BMH1M</b>
M6-0.7 x 38 mm pan-head steel screws and lockwashers	KD PV KD PVS	<b>BMH3M</b>
—	JG PVS	Included <sup>①</sup>
—	LG PV	Included <sup>①</sup>
M8-1.25 x 35 mm pan-head steel screws and lockwashers	MDL PV	<b>BMH5M</b>
<b>Interphase Barriers</b>		
	FD PV FD PVS	<b>IPB1</b>
	KD PV KD PVS	<b>IPB3</b>
	JG PVS	<b>FJIPBK</b> <sup>②</sup>
	LG PV	<b>IPB3</b>
	MDL PV	<b>IPB4</b>
<b>Non-Padlockable Handle Block</b>		
	FD PV FD PVS	<b>LKD1</b>
	KD PV KD PVS	<b>LKD3</b>
	JG PVS	N/A
	LG PV	N/A
	MDL PV	<b>LKD4</b>
<b>Padlockable Handle Lock Hasp</b> <sup>③</sup>		
	FD PV FD PVS	<b>PLK1</b>
	KD PV KD PVS	<b>PLK3</b>
	JG PVS	<b>FJPHL</b>
	LG PV	<b>LPHL</b>
	MDL PV	<b>HLK4</b>

**Factory Modifications—Freeze Testing to -40°C** <sup>④</sup>

Frame	Modification Code
FD PV and FD PVS	F01
JG PVS	F01
KD PV and KD PVS	F01
LG PV	F01
MDL PV	F01
Special calibration—contact Eaton for availability	

**Molded Case Switches**

Eaton’s DC molded case switches (MCS) are used in applications requiring a compact, high capacity disconnect. PVGard 1000 Vdc

MCS are UL 489B listed and have automatic instantaneous current protection. These devices do not provide overload protection.

**Molded Case Switches**

Maximum Continuous Ampere Rating at 50°C	Interrupting Capacity Vdc	Poles in Series	Catalog Number
<b>1000 Vdc Maximum</b>			
100	3000	4	<b>FDPV4100KW</b>
200	5000	4	<b>KDPV4200KW</b>
250	5000	4	<b>KDPV4250KW</b>
350	5000	4	<b>KDPV4350KW</b>
400	5000	4	<b>LGPV4400KSW</b>
600	7500	3	<b>MDLPV3600KSW</b>

**Notes**

- ① Base mounting hardware is included with a circuit breaker or a molded case switch (included with breaker). If required separately, order 66A2546G02.
- ② Individually priced.
- ③ Locks in ON and OFF position.
- ④ Add 20% to list price.

#### Internal Accessories—Right Pole Mounting

	FD PV <sup>①</sup> FD PVS		JG PVS		KD PV KD PVS		LG PV		MDL PV	
	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number
<b>Auxiliary Switch</b>										
1A-1B	A06	A1X1PK	A1	AUX1A1BPK	A06	A1X3PK	A1	AUX1A1BPK	A06	A1X4PK
2A-2B	A13	A2X1RPK	A2	AUX2A2BPK	A13	A2X3PK	A2	AUX2A2BPK	A13	A2X4PK
<b>Alarm Switch</b>										
1 make/1 break	B06	A1L1RPK	B1	ALM1M1BJPKL	B06	A1L3RPK	B1	ALM1M1BJPK	B06	A1L4RPK
<b>Auxiliary and Alarm Combo</b>										
1A-1B, 1 make/1 break	C05	AAL1RPK	B2w	AUXALRMJPK	C05	AAL3RPK	B2	AUXALRMJPK	C05	AA114RPK

#### Internal Accessories—Left Pole Mounting

	FD PV <sup>①</sup> FD PVS		JG PVS		KD PV KD PVS		LG PV		MDL PV	
	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number
<b>Shunt Trip</b>										
12 Vdc	S02	SNT1LP03K	S4	SNT012CPK	S42	SNT3P04K	S4	SNT012CPK	S02	SNT4LP03K
24 Vdc	S02	SNT1LP03K	S1	SNT060CPK	S42	SNT3P04K	S1	SNT060CPK	S02	SNT4LP03K
48 Vdc	S06	SNT1LP08K	S1	SNT060CPK	S50	SNT3P06K	S1	SNT060CPK	S86	SNT4LP23K
60 Vdc	S06	SNT1LP08K	S1	SNT060CPK	S50	SNT3P06K	S1	SNT060CPK	S86	SNT4LP23K
125 Vdc	S10	SNT1LP12K	S5	SNT125DPK	S10	SNT3P11K	S2	SNT120CPK	S42	SNT4LP26K
250 Vdc	S14	SNT1LP18K	—	—	S14	SNT3P14K	—	—	S14	SNT4LP14K
120 Vac	S10	SNT1LP12K	S2	SNT120CPK	S10	SNT3P11K	S2	SNT120CPK	S10	SNT4LP11K
<b>Undervoltage Release</b>										
12 Vdc	U30	UVH1LP20K	—	—	T02	UVH3LP20K	U1	UVR012DPK	T02	UVH4LP20K
24 Vdc	U34	UVH1LP21K	U2	UVR024CPK	T02	UVH3LP21K	U2	UVR024DPK	T06	UVH4LP21K
48 Vdc	U38	UVH1LP22K	U4	UVR048DPK	T10	UVH3LP22K	U4	UVR048DPK	T10	UVH4LP22K
60 Vdc	—	—	U4	UVR048DPK	—	—	—	—	—	—
125 Vdc	U42	UVH1LP26K	U6	UVR125DPK	T14	UVH3LP26K	U6	UVR125DPK	T14	UVH4LP26K
250 Vdc	U46	UVH1LP28K	U8	UVR250DPK	T18	UVH3LP28K	U8	UVR250DPK	T18	UVH4LP28K
120 Vac	U14	UVH1LP08K	U5	UVR120APK	U18	UVH3LP08K	U5	UVR120APK	U18	UVH4LP08K

#### Notes

① Underwriters Laboratories requires that internal accessories for the FD PV be installed at the factory. Internal accessories are UL listed for factory installation under E7819. Where local codes and standards permit and UL listing is not required, internal accessories can be field installed. Accessory installation should be done before the circuit breaker is mounted and connected.

One accessory can be mounted per pole, per breaker.

## PVGard Solar Circuit Breaker Terminal Offering

Breaker Frame	Maximum Breaker Ampacity	Terminal Body Material	Wire Type	AWG Wire Range/ Number of Conductors	Metric Wire Range mm <sup>2</sup>	Number of Terminals Included	Standard Terminal Catalog Number	Comments
FD PV	50	Steel	Cu/Al	14–4 (1)	2.5–25 (1)	3	3TA50FB	
FD PVS	100	Aluminum	Cu/Al	6–300 kcmil (1)	16–150 (1)	3	3TA225FDK	Includes 3P terminal cover
	100	Copper	Cu	4–4/0 (1)	25–95 (1)	3	3T225FD	
JG PVS	250	Aluminum	Cu/Al	#8–350 kcmil (1)	—	—	TA250FJ	
	250	Aluminum	Cu/Al	(2) 2/0–(2) 4/0	—	①	3TA251FJK1	
	250	Aluminum	Cu/Al	(2) 2/0–(2) 4/0	—	②	3TA251FJK2	
	250	Copper	Cu	#4–350 kcmil (1)	—	—	T250FJ	
KD PV	225	Aluminum	Cu/Al	3–350 kcmil (1)	35–185 (1)	1	TA300K	
KD PVS	250	Aluminum	Cu/Al	250–500 kcmil (1)	120–240 (1)	1	TA350K	
	250	Aluminum	Cu/Al	3/0–250 kcmil (2)	95–120 (1)	4	4TA400K	Contains interphase barriers
	250	Aluminum	Cu/Al	2/0–250 kcmil (2) or 2/0–500 kcmil (1)	70–240 (2)	4	4TA401K	
	300	Aluminum	Cu/Al	3/0–250 kcmil (2)	95–120 (2)	4	4TA401K	Contains interphase barriers
	350	Aluminum	Cu/Al	3/0–250 kcmil (2)	95–120 (2)	4	4TA401K	Contains interphase barriers
	225	Copper	Cu	3–350 kcmil (1)	35–185 (1)	1	T300K	
	250	Copper	Cu	250–500 kcmil (1)	120–240 (1)	1	T350K	
	250	Copper	Cu	3/0–250 kcmil (2)	95–120 (1)	4	4T400K	Contains interphase barriers
	300	Copper	Cu	3/0–250 kcmil (2)	95–120 (2)	4	4TA401K	Contains interphase barriers
	350	Copper	Cu	3/0–250 kcmil (2)	95–120 (2)	4	4TA401K	Contains interphase barriers
LG PV	400	Aluminum	Cu/Al	2–500 kcmil (2)	35–240 (2)	4	4TA632LK	Includes 4P terminal cover
	250	Copper	Cu	2–500 kcmil (1)	35–240 (1)	1	T350LK	
	400	Copper	Cu	2–500 kcmil (2)	35–240 (2)	4	4T632LK	Includes 4P terminal cover
MDL PV	300	Aluminum	Cu/Al	1–500 kcmil (2)	—	1	TA700MA1	
	600	Aluminum	Cu/Al	3/0–400 kcmil (3)	—	1	TA800MA2	

## Endcap Kits

Breaker Frame	Number of Poles	Thread Type	Thread Size	Catalog Number
FD PV	4	Imperial	10–32	KPEK14
	4	Metric	M–5	KPEKM14
JG PVS	3	Imperial	—	FJ3RTDK
	3	Metric	—	FJ3RTWK
KD PVS	3	Imperial	—	KPEK3
	3	Metric	—	KPEKM3
KD PV	4	Imperial	0.312–18	KPEK34
	4	Metric	M–8	KPEKM34
LG PV	4	Imperial	—	N/A
	4	Metric	M-10	L4RTWK
MDL PV	3	Imperial	—	—
	3	Metric	—	—

## Notes

- ① Three terminals with terminal shield as a kit.  
 ② Three terminals with two interphase barriers as a kit.



**Technical Data and Specifications**

- Thermal-magnetic circuit breakers
- Designed to meet UL 489B for solar photovoltaic circuit protection
- 100% rated of the continuous current rating
- 50°C calibrated
- Can be applied in grounded, ungrounded or bi-polar systems
- Ability to open on signal from DC arc or ground fault detector
- Two PVGard lineups
  - UL File EE350638, Category Control Number DIUR
  - 600 Vdc per-pole breaker and switch
    - Each pole rated 600 Vdc
  - 1000 Vdc poles-in-series breaker and switch
    - Requires poles in series connection

**Quick Reference PVGard Solar Circuit Breakers  
600 Vdc Per-Pole****PVGard 600 Vdc Current Ratings by Frame  
UL 489B Interrupting Capacity (kA) 600 Vdc Per-Pole**

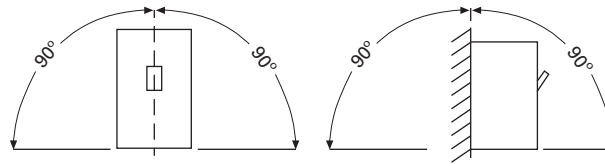
Circuit Breaker Type	Minimum Amperes	Maximum Amperes	kA Rating
FD PVS	30	100	1.2
JG PVS	90	250	1.2
KD PVS	100	400	3

**Quick Reference PVGard Solar Circuit Breakers  
1000 Vdc Poles-in-Series****PVGard 1000 Vdc Current Ratings by Frame  
UL 489B Interrupting Capacity (kA) 1000 Vdc**

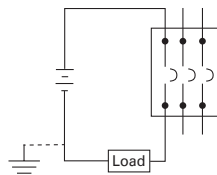
Circuit Breaker Type	Minimum Amperes	Maximum Amperes	kA Rating	Poles in Series
FD PV	30	100	3	4
KD PV	125	350	5	4
LG PV	250	400	5	4
MDL PV	300	600	7.5	3

### PVGard 600 Vdc Per-Pole Solar PV Circuit Breakers (100% and 80% Rated Frames)

	FD PVS	JG PVS	KD PVS
Number of 600 Vdc circuits	1 or 2	3	3
Maximum voltage rating	600 Vdc	600 Vdc	600 Vdc
Ampere range	30–150A	90–250A	100–400A
Interrupting capacity at 600 Vdc	1.2 kA	1.2 kA	3 kA
Time constant	1 ms	1 ms	1 ms
Trip unit type	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic
Rated impulse withstand voltage			
Main conducting paths	8 kV	8 kV	8 kV
Auxiliary circuits	4 kV	4 kV	4 kV
Endurance			
Mechanical operations	10,000	10,000	6000
Electrical operations	1000	400	400
Maximum switching frequency	300 per hour	240 per hour	240 per hour
Third-party certification	UL 489B	UL 489B	UL 489B
Environment			
Design ambient temperature	50°C	50°C	50°C
Maximum current at 60°C, as % of rated current	TBD	93%	93%
Maximum current at 70°C, as % of rated current	TBD	85%	85%
Operating temperature range	–20°C to +50°C	–20°C to +50°C	–20°C to +50°C
Storage temperature range	–20°C to +70°C	–20°C to +70°C	–20°C to +70°C
Suitable for freeze temperatures to –40°C	Option	Option	Option
Relative humidity	0 to 95% noncondensing	0 to 95% noncondensing	0 to 95% noncondensing
Suitable for reverse-feed applications	Yes	Yes	Yes
Mounting—permissible mounting position			



#### Connection diagrams



Suitable for grounded or ungrounded systems.  
Suitable for quantity (3) 600 Vdc circuits.

Suitable for grounded or ungrounded systems  
Suitable for quantity (3) 600 Vdc circuits

Terminations			
Al/Cu wire	3T100FB: (1) #14–1/0	TA250FJ: (1) #8–350 kcmil	TA300K: (1) #3–350 kcmil
	3TA225FDK: (1) #6–300 kcmil ①	3TA251FJK1: (2) 2/0–(2) 4/0 ②	TA350K: (1) 250–500 kcmil
		3TA251FJK2: (2) 2/0–(2) 4/0 ③	TA403K: (2) 1/0–400 kcmil
			3TA402K: (1) 500–750 kcmil ④
Cu wire	3T150FB: (1) #4–4/0	T250FJ: (1) #4–350 kcmil	T300K: (1) #3–350 kcmil
Dimensions in inches (mm)			
Height	6.00 (152.4)	7.00 (177.8)	10.13 (257.3)
Width	Three-pole: 4.13 (104.9)	4.13 (104.9)	5.50 (139.7)
Depth	3.38 (85.9)	3.57 (90.7)	4.10 (104.1)
Weight in lbs	6	6.6	11.42

#### Notes

- ① Line/top side connection only PVGard FD PVS breakers.
- ② Three terminals with terminal shield as a kit.
- ③ Three terminals with two interphase barriers as a kit.
- ④ Not UL 489B recognized size for maximum of 400A breaker.

# 2.6

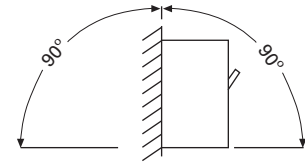
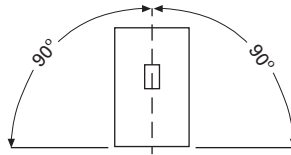
## Molded Case Circuit Breakers

### Specialty Breakers

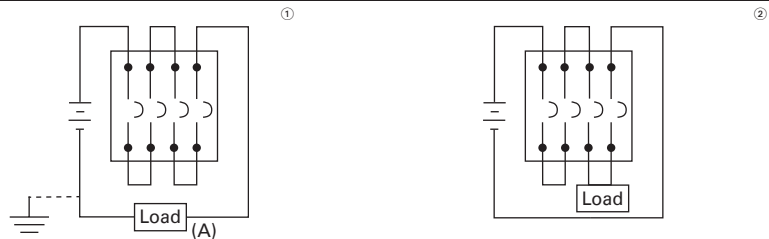
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#### PVGard 1000 Vdc Solar PV Circuit Breakers (100% and 80% Rated Frames)

	FD PV	KD PV	LG PV	MDL PV
Number of poles	4	4	4	3
Maximum voltage rating	1000 Vdc	1000 Vdc	1000 Vdc	1000 Vdc
Maximum current rating	100A	350A	400A	600A
Interrupting capacity at 1000 Vdc	3 kA	5 kA	5 kA	7.5 kA
Time constant	1 ms	1 ms	1 ms	1 ms
Ampere range	15–100A	125–350A	250–400A	300–600A
Trip unit type	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic
Rated impulse withstand voltage				
Main conducting paths	8 kV	8 kV	8 kV	8 kV
Auxiliary circuits	4 kV	4 kV	4 kV	4 kV
Endurance				
Mechanical operations	10,000	10,000	8000	8000
Electrical operations	1000	400	400	400
Maximum switching frequency	300 per hour	240 per hour	240 per hour	240 per hour
Third-party certification	UL 489B	UL 489B	UL 489B	UL 489B
Environment				
Design ambient temperature	50°C	50°C	50°C	50°C
Maximum current at 60°C, as % of rated current	91%	91%	93%	93%
Maximum current at 70°C, as % of rated current	88%	88%	88%	88%
Operating temperature range	–20°C to +50°C	–20°C to +50°C	–20°C to +50°C	–20°C to +50°C
Storage temperature range	–20°C to +70°C	–20°C to +70°C	–20°C to +70°C	–20°C to +70°C
Suitable for freeze temperatures to –40°C	Option	Option	Option	Option
Relative humidity	0 to 95% noncondensing	0 to 95% noncondensing	0 to 95% noncondensing	0 to 95% noncondensing
Suitable for reverse-feed applications	Yes	Yes	Yes	Yes
Mounting—permissible mounting position				



#### Connection diagrams



#### Terminations

Al/Cu wire	#6–300 kcmil	(2) 3/0–250 kcmil	(2) #2–500 kcmil	(3) 3/0–400 kcmil
Cu wire	#4–4/0	(2) 3/0–250 kcmil	(2) #2–500 kcmil	(3) 3/0–300 kcmil
Dimensions in inches (mm)				
Height	6.00 (152.4)	10.13 (257.3)	10.13 (257.3)	16.00 (406.4)
Width	5.50 (139.7)	7.22 (183.4)	7.22 (183.4)	8.25 (209.5)
Depth	3.38 (85.9)	4.09 (103.9)	4.09 (103.9)	4.06 (103.1)
Weight in lbs	6	20	20	29

#### Notes

- ① Suitable for use on ungrounded systems, or grounded systems that have one end of load (A) connected to grounded terminal, opposite poles in series connection.
- ② Suitable for use on ungrounded systems only.

**Dimensions**

Approximate Dimensions in Inches (mm)

**PVGard Solar Circuit Breakers—600 Vdc Per-Pole**

Frame	Number of Circuits in a Frame	Width	Height	Depth
FD PVS	1, 2	4.13 (104.9)	6.00 (152.4)	3.38 (85.7)
JG PVS	3	4.13 (104.9)	7.00 (177.8)	3.44 (87.4)
KD-PVS	3	5.49 (139.4)	10.13 (257.2)	4.31 (109.6)

**PVGard Solar Circuit Breakers—1000 Vdc Poles-in-Series**

Frame	Number of Poles	Width	Height	Depth
FD PV	4	5.50 (139.7)	6.00 (152.4)	3.38 (86.0)
KD PV	4	7.22 (183.4)	10.13 (257.3)	4.09 (103.9)
LG PV	4	7.22 (183.4)	10.13 (257.3)	4.09 (103.9)
MDL PV	3	8.25 (209.6)	16.00 (406.4)	4.06 (103.1)

# 2.6

## Molded Case Circuit Breakers

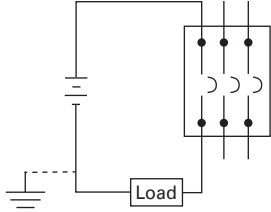
### Specialty Breakers

#### Wiring Diagrams

##### Series Connection Diagrams for DC Application ①②

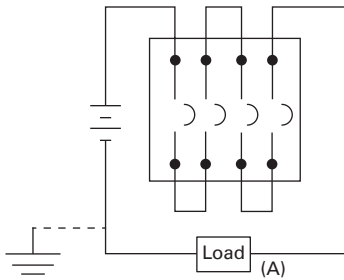
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##### FD PVS, JF PVS, KD PVS—600 Vdc Per-Pole

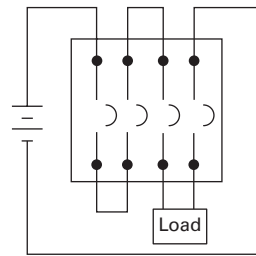


Suitable for grounded or ungrounded systems.  
Suitable for quantity (3) 600 Vdc circuits.

##### FD PV, KD PV, LG PV—1000 Vdc Maximum—Four Poles-in-Series

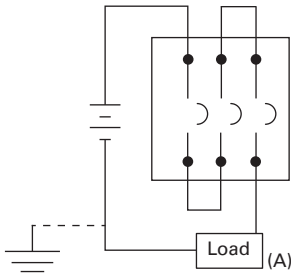


Suitable for use on ungrounded systems, or grounded systems that have one end of load (A) connected to grounded terminal, opposite poles in series connection.

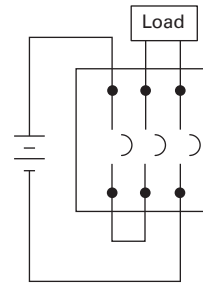


Suitable for use on ungrounded systems only.

##### MDL PV—1000 Vdc Maximum—Three Poles in Series



Suitable for use on ungrounded systems, or grounded systems that have one end of load (A) connected to grounded terminal, opposite poles in series connection.

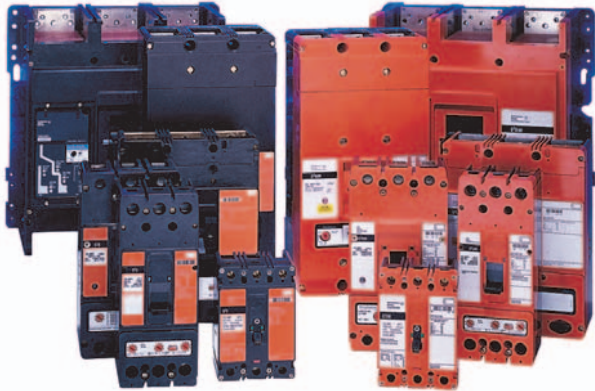


Suitable for use on ungrounded systems only.

#### Notes

- ① Poles in series connection is customer supplied. Use rated cable per NEC.
- ② For grounded systems, all poles in series must be connected on non-grounded terminal, with load connected to grounded terminal.

E<sup>2</sup> Mining Service Breakers



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E <sup>2</sup> Mining Service Breakers	
Product Selection . . . . .	<b>V4-T2-371</b>
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E<sup>2</sup> Mining Service Breakers

Product Overview

State-of-the-art E<sup>2</sup> mining service breakers incorporate the rigid specifications and testing procedures developed by a focus group led by engineers from several large coal companies and Eaton design engineers. Additionally, the performance of these breakers was proven and verified during hundreds of hours of field testing in harsh mine environments.

E<sup>2</sup> mining breakers are available in 600 Vac and 1000Y/577 Vac. Interchangeable trip units can be used on either 600 or 1000 Vac frames.

The E<sup>2</sup> mining breaker family is designed especially for trailing cable application per MSHA 30 CFR 75. Field interchangeable electronic rms sensing trip units are available from 150 to 2000 amperes with instantaneous pickup settings conforming to the code of Federal Regulations 30 CFR 75.601-2. Electromechanical trip units are also available with a wide range of magnetic pickup ranges.

E<sup>2</sup> electronic trip units are the first to provide the mining industry with true rms sensing, made possible by the custom ASIC microprocessor in each electronic trip unit.

E<sup>2</sup> breakers are designed to be physically and electrically interchangeable with Classic Mining Service Breakers and supersede Series C<sup>®</sup> Mining Service Breakers. The table to the right outlines direct replacements.

600 Vac Mining Breaker Replacement Chart

Classic	Series C	E <sup>2</sup>
FBM	FDBM	E <sup>2</sup> F
HFBM	FDM	E <sup>2</sup> F
	HFDM (mag. only)	E <sup>2</sup> F
—	JDM	E <sup>2</sup> J
KAM	KDM	E <sup>2</sup> K
KAMH	KDM	E <sup>2</sup> K
LAM	LDM	E <sup>2</sup> L
LAMH	LDM	E <sup>2</sup> L
LCM	LDM	E <sup>2</sup> L
LCMH	LDM	E <sup>2</sup> L
MAM	—	E <sup>2</sup> M
MAMH	—	E <sup>2</sup> M
MCM	—	E <sup>2</sup> M
MCMH	—	E <sup>2</sup> M
NBM	—	E <sup>2</sup> N
NBMH	—	E <sup>2</sup> N
NCM	—	E <sup>2</sup> N
NCMH	—	E <sup>2</sup> N

1000 Vac Mining Breaker Replacement Chart

Classic	Series C	E <sup>2</sup> M
HFM	—	E <sup>2</sup> FM
—	JDCM	E <sup>2</sup> JM
HKAM	KDCM	E <sup>2</sup> KM
HLAM	LDCM	E <sup>2</sup> LM
HLCM	LDCM	E <sup>2</sup> LM
HMAM	—	E <sup>2</sup> MM
HMCM	—	E <sup>2</sup> MM
HNBM	—	E <sup>2</sup> NM
HNBMH	—	E <sup>2</sup> NM
HNCM	—	E <sup>2</sup> NM
HLCLM	—	E <sup>2</sup> NM
HPBM	—	E <sup>2</sup> RM ①

Additional Information on Mining Breakers

Source	Description
TD01217001E	E <sup>2</sup> Mining Circuit Breaker Dimensional Data
BR01217001E	E <sup>2</sup> Mining Circuit Breaker Brochure
TC01217001E	E <sup>2</sup> Mining Circuit Breaker Time Current Curves
www.eaton.com/mining	Mining and Metals

Note

① E<sup>2</sup>R/E<sup>2</sup>RM is a new frame physically different than the HPBM. See DS29-170MS.

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## Molded Case Circuit Breakers

### Specialty Breakers

2

Eaton's mining service circuit breakers provide short-circuit protection as specified in the code of Federal Regulations 30 CFR 75.601-2. E<sup>2</sup> 225/400A K frame and 400/600A L frame electronic trip units feature specifically designed instantaneous pickup settings to conform exactly with the code of

Federal Regulations 30 CFR 75.601-2. Electromechanical trip units are also available with a wide range of magnetic pickup ranges.

The tables below list the conductor size maximum allowable circuit breaker instantaneous setting and the E<sup>2</sup> breaker that meets that setting.

#### Interrupting Capacity Rating

Circuit Breaker Type	Interrupting Capacity (Symmetrical kA)				Vdc <sup>①</sup>
	Vac (50/60 Hz)				
	240	480	600	1000V/577	
E <sup>2</sup> F	65	25	18	—	10
E <sup>2</sup> J	65	35	18	—	10
E <sup>2</sup> K	65	35	25	—	10
E <sup>2</sup> LME	100	65	35	—	42
E <sup>2</sup> L	65	35	25	—	22
E <sup>2</sup> M	65	35	25	—	22
E <sup>2</sup> N	65	50	25	—	—
E <sup>2</sup> R	125	65	50	—	—
E <sup>2</sup> FM	65	25	18	10	10
E <sup>2</sup> JM	65	35	18	10	22
E <sup>2</sup> KM	65	35	25	14	10
E <sup>2</sup> LMZ	100	65	35	10	42
E <sup>2</sup> LM	—	35	25	18	22
E <sup>2</sup> MM	—	35	25	18	22
E <sup>2</sup> NM <sup>②</sup>	—	50	25	25	—
E <sup>2</sup> RM	—	65	50	25	—

#### Trailing Cable Setting Per 30 CFR 75

Conductor Size	Maximum Breaker Instantaneous Setting	Maximum Ampere 75°C Insulated Conductor	E <sup>2</sup> /E <sup>2</sup> M Instantaneous Only	Setting
14	50	15	E <sup>2</sup> K 150A	A
12	75	20	E <sup>2</sup> K 150A	B
10	150	30	E <sup>2</sup> K 150A	C
8	200	50	E <sup>2</sup> K 225A	A
6	300	65	E <sup>2</sup> K 225A	B
4	500	85	E <sup>2</sup> K 225A/E <sup>2</sup> L 400A	C/A
3	600	100	E <sup>2</sup> K 225A/E <sup>2</sup> L 400A	D/B
2	800	115	E <sup>2</sup> K 225A/E <sup>2</sup> L 400A	E/C
1	1000	130	E <sup>2</sup> K 225A/E <sup>2</sup> L 400A	F/D
1/0	1250	150	E <sup>2</sup> K 225A/E <sup>2</sup> L 400A	G/E
2/0	1500	175	E <sup>2</sup> K 225A/E <sup>2</sup> L 400A	H/F
3/0	2000	200	E <sup>2</sup> L 400A	G
4/0	2500	230	E <sup>2</sup> L 400A	H
250	2500	255	E <sup>2</sup> L 400A	H
300	2500	285	E <sup>2</sup> L 400A	H
350	2500	310	E <sup>2</sup> L 400A	H
400	2500	335	E <sup>2</sup> L 400A	H
500	2500	380	E <sup>2</sup> L 400A	H

#### Auxiliary Switch Electrical Rating Data

Maximum Voltage	Frequency	Maximum Current Amperes
600	50/60 Hz	6.0
125	DC	0.5 (non-inductive load)
250	DC	0.25 (non-inductive load)

#### Alarm (Signal/Lockout Switch) Electrical Rating Data

Maximum Voltage	Frequency	Maximum Current Amperes
600	50/60 Hz	6.0
125	DC	0.5 (non-inductive load)
250	DC	0.25 (non-inductive load)

#### Notes

- ① Two poles in series. DC rating applies to breakers with thermal-magnetic trip unit. Breakers with electronic trip units are not DC rated.
- ② Series rated for application with Eaton's E<sup>2</sup>KM and E<sup>2</sup>LM breakers.

## Undervoltage Release Mechanism Electrical Rating Data

Breaker Type	Supply Voltage	Dropout Voltage		Pickup Voltage Maximum	VA
		Minimum	Maximum		
E <sup>2</sup> F/E <sup>2</sup> FM	110 Vac	44.5	77	93.5	1.3
	120 Vac				1.5
	127 Vac				1.7
	110 Vdc				1.5
	120 Vdc				1.7
	125 Vdc				1.9
E <sup>2</sup> J/E <sup>2</sup> JM	110 Vac	44.5	77	93.5	1.8
	120 Vac				2.1
	127 Vac				2.4
	110 Vdc				1.6
	120 Vdc				1.9
	125 Vdc				2.2
E <sup>2</sup> K/E <sup>2</sup> KM	110 Vac	44.5	77	93.5	1.8
	120 Vac				2.1
	127 Vac				2.4
	110 Vdc				1.6
	120 Vdc				1.9
	125 Vdc				2.2
E <sup>2</sup> LME/E <sup>2</sup> LMZ	110 Vac	44.5	77	93.5	0.96
	120 Vac				1.13
	127 Vac				1.25
	110 Vdc	43.8	77	93.5	0.94
	120 Vdc				1.12
	125 Vdc				1.21
E <sup>2</sup> L/E <sup>2</sup> LM/E <sup>2</sup> M/E <sup>2</sup> MM	110 Vac	44.5	77	93.5	1.8
	120 Vac				2.1
	127 Vac				2.4
	110 Vdc				1.6
	120 Vdc				1.9
	125 Vdc				2.2
E <sup>2</sup> N/E <sup>2</sup> NM	110 Vac	44.5	77	93.5	1.8
	120 Vac				2.1
	127 Vac				2.4
	110 Vdc				1.6
	120 Vdc				1.9
	125 Vdc				2.2
E <sup>2</sup> R/E <sup>2</sup> RM	110 Vac	44.5	77	93.5	3.3
	120 Vac				3.6
	127 Vac				3.8
	110 Vdc	43.8	77	93.5	3.3
	120 Vdc				3.6
	125 Vdc				3.8



# 2.6

## Molded Case Circuit Breakers

### Specialty Breakers

#### Shunt Trip Electrical Rating Data

2

Breaker Type	Supply Voltage	Operating Voltage		
		Minimum	VA	
E <sup>2</sup> F/E <sup>2</sup> FM	48 Vac	33.6	92	
	60 Vac		140	
	110 Vac		480	
	120 Vac		570	
	127 Vac		640	
	208 Vac	146	180	
	220 Vac		200	
	230 Vac		240	
	48 Vdc		33.6	100
	60 Vdc			160
	110 Vdc	77		55
	120 Vdc			66
	125 Vdc			71
	E <sup>2</sup> J/E <sup>2</sup> JM	110 Vac	60.5	66
120 Vac		84		
127 Vac		102		
110 Vdc		77	112	
120 Vdc			138	
125 Vdc			150	
E <sup>2</sup> K/E <sup>2</sup> KM	110 Vac	60	100	
	120 Vac		120	
	127 Vac		140	
	110 Vdc		77	110
	120 Vdc			130
	125 Vdc	140		
	24 Vac	41		
	48 Vac	18		139
	60 Vac		210	
	E <sup>2</sup> LME/E <sup>2</sup> LMZ	110 Vac	60	83
120 Vac		92		
127 Vac		117		
24 Vdc		120		
48 Vdc		18		475
60 Vdc			720	
110 Vdc			82	99
120 Vdc				120
125 Vdc				121

Breaker Type	Supply Voltage	Operating Voltage		
		Minimum	VA	
E <sup>2</sup> L/E <sup>2</sup> LM/E <sup>2</sup> M/E <sup>2</sup> MM	48 Vac	34	830	
	60 Vac		1280	
	110 Vac		60	100
	120 Vac			120
	127 Vac			140
	48 Vdc	34		710
	60 Vdc			1105
	110 Vdc		77	110
	120 Vdc			130
	125 Vdc			140
E <sup>2</sup> N/E <sup>2</sup> NM	110 Vac	60	100	
	120 Vac		120	
	127 Vac		140	
	110 Vdc		77	
E <sup>2</sup> R/E <sup>2</sup> RM	110 Vac	60.5	330	
	120 Vac		390	
	127 Vac		430	
	110 Vdc		77	
	120 Vdc		440	
	125 Vdc		480	

## Product Selection

E<sup>2</sup>F/E<sup>2</sup>FM

**Thermal-Magnetic Circuit Breakers—Sealed Breakers with Non-Interchangeable Trip Unit—Include Line/Load Terminals**

2

**600 Vac Maximum, 250 Vdc, 25 kA at 480 Vac, Three-Pole** <sup>①</sup>

Maximum Continuous Ampere Rating at 40°C	Catalog Number
15	E2F3015
20	E2F3020
25	E2F3025
30	E2F3030
35	E2F3035
40	E2F3040
45	E2F3045
50	E2F305
60	E2F3060
70	E2F3070
80	E2F3080
90	E2F3090
100	E2F3100
125	E2F3125
150	E2F3150

E<sup>2</sup>F/E<sup>2</sup>FM

**1000Y/577 Vac Maximum, 250 Vdc, 10 kA at 1000 Vac, Three-Pole**

Maximum Continuous Ampere Rating at 40°C	Catalog Number
15	—
20	E2FM3020
25	E2FM3025
30	—
35	—
40	E2FM3040
45	—
50	E2FM3050
60	E2FM3060
70	E2FM3070
80	E2FM3080
90	E2FM3090
100	E2FM3100
125	E2FM3125
150	E2FM3150

**Note**

<sup>①</sup> For two-pole application, use outer poles.

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## Molded Case Circuit Breakers

### Specialty Breakers

#### E<sup>2</sup>F/E<sup>2</sup>FM

2

**Magnetic Only Circuit Breakers—Sealed Breakers with Non-Interchangeable Trip Unit—Include Line/Load Terminals**

#### 600 Vac Maximum, 250 Vdc, 25 kA at 480 Vac, Three-Pole

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Catalog Number
3	9–30	E2F003AM
7	21–70	E2F007CM
15	45–150	E2F015EM
30	90–300	E2F030HM
	50–150	E2F030EM
50	150–500	E2F050KM
	66–190	E2F050YM
70	210–700	E2F070MM
	150–500	E2F100KM
100	300–1000	E2F100RM
	450–1500	E2F150TM
150	750–2500	E2F150UM

#### 1000Y/577 Vac Maximum, 250 Vdc, 10 kA at 1000 Vac, Three-Pole

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Catalog Number
3	9–30	—
7	21–70	—
15	45–150	—
30	90–300	—
	50–150	—
50	150–500	E2FM050KM
	66–190	E2FM050YM
70	210–700	E2FM070MM
	150–500	E2FM100KM
100	300–1000	E2FM100RM
	450–1500	E2FM150TM
150	750–2500	E2FM150UM

E<sup>2</sup>J/E<sup>2</sup>JM

Circuit Breakers with Interchangeable Thermal-Magnetic Trip Unit

600 Vac Maximum, 250 Vdc, 35 kA at 480 Vac, Three-Pole

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
70	300–650	E2J3070W	E2J3250F	E2J3070T
90	450–900	E2J3090W	E2J3250F	E2J3090T
100	500–1000	E2J3100W	E2J3250F	E2J3100T
125	625–1250	E2J3125W	E2J3250F	E2J3125T
150	750–1500	E2J3150W	E2J3250F	E2J3150T
175	875–1750	E2J3175W	E2J3250F	E2J3175T
200	1000–2000	E2J3200W	E2J3250F	E2J3200T
225	300–650	E2J3225AW	E2J3250F	E2J3225TA
	500–1000	E2J3225DW	E2J3250F	E2J3225TD
	1125–2250	E2J3225W	E2J3250F	E2J3225T
250	1250–2500	E2J3250W	E2J3250F	E2J3250T

E<sup>2</sup>J/E<sup>2</sup>JM



1000Y/577 Vac Maximum, 250 Vdc, 10 kA at 1000 Vac, Three-Pole

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
70	300–650	E2JM3070W	E2JM3250F	E2J3070T
90	450–900	E2JM3090W	E2JM3250F	E2J3090T
100	500–1000	E2JM3100W	E2JM3250F	E2J3100T
125	625–1250	E2JM3125W	E2JM3250F	E2J3125T
150	750–1500	E2JM3150W	E2JM3250F	E2J3150T
175	875–1750	E2JM3175W	E2JM3250F	E2J3175T
200	1000–2000	E2JM3200W	E2JM3250F	E2J3200T
225	300–650	E2JM3225AW	E2JM3250F	E2J3225TA
	500–1000	E2JM3225DW	E2JM3250F	E2J3225TD
	1125–2250	E2JM3225W	E2JM3250F	E2J3225T
250	1250–2500	E2JM3250W	E2JM3250F	E2J3250T

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## Molded Case Circuit Breakers

### Specialty Breakers

#### E<sup>2</sup>J/E<sup>2</sup>JM

#### Circuit Breakers with Interchangeable Magnetic Only Trip Unit

2

#### 600 Vac Maximum, 250 Vdc, 25 kA at 480 Vac, Three-Pole

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
250	300–650	E2J3250MAW	E2J3250F	E2J3250TMA
	450–900	E2J3250MCW	E2J3250F	E2J3250TMC
	500–1000	E2J3250MDW	E2J3250F	E2J3250TMD
	625–1250	E2J3250MFW	E2J3250F	E2J3250TMF
	750–1500	E2J3250MGW	E2J3250F	E2J3250TMG
	875–1750	E2J3250MJW	E2J3250F	E2J3250TMJ
	1000–2000	E2J3250MKW	E2J3250F	E2J3250TMK
	1125–2250	E2J3250MLW	E2J3250F	E2J3250TML
	1250–2500	E2J3250MW	E2J3250F	E2J3250TM

#### 1000Y/577 Vac Maximum, 250 Vdc, 10 kA at 1000 Vac, Three-Pole

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
250	300–650	E2JM3250MAW	E2JM3250F	E2J3250TMA
	450–900	E2JM3250MCW	E2JM3250F	E2J3250TMC
	500–1000	E2JM3250MDW	E2JM3250F	E2J3250TMD
	625–1250	E2JM3250MFW	E2JM3250F	E2J3250TMF
	750–1500	E2JM3250MGW	E2JM3250F	E2J3250TMG
	875–1750	E2JM3250MJW	E2JM3250F	E2J3250TMJ
	1000–2000	E2JM3250MKW	E2JM3250F	E2J3250TMK
	1125–2250	E2JM3250MLW	E2JM3250F	E2J3250TML
	1250–2500	E2JM3250MW	E2JM3250F	E2J3250TM

E<sup>2</sup>K/E<sup>2</sup>KM

## Circuit Breakers with Interchangeable Thermal-Magnetic Trip Unit

2

## 600 Vac Maximum, 250 Vdc, 35 kA at 480 Vac, Three-Pole

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
100	500–1000	E2K3100W	E2K3400F	E2K3100T
125	625–1250	E2K3125W	E2K3400F	E2K3125T
150	750–1500	E2K3150W	E2K3400F	E2K3150T
175	875–1750	E2K3175W	E2K3400F	E2K3175T
200	1000–2000	E2K3200W	E2K3400F	E2K3200T
225	300–650	E2K3225AW	E2K3400F	E2K3225TA
	500–1000	E2K3225DW	E2K3400F	E2K3225TD
	1125–2250	E2K3225W	E2K3400F	E2K3225T
250	1250–2500	E2K3250W	E2K3400F	E2K3250T
300	1500–3000	E2K3300W	E2K3400F	E2K3300T
350	1750–3500	E2K3350W	E2K3400F	E2K3350T
400	2000–4000	E2K3400W	E2K3400F	E2K3400T

E<sup>2</sup>K/E<sup>2</sup>KM

## 1000Y/577 Vac Maximum, 250 Vdc, 14 kA at 1000 Vac, Three-Pole

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
100	500–1000	E2KM3100W	E2KM3400F	E2K3100T
125	625–1250	E2KM3125W	E2KM3400F	E2K3125T
150	750–1500	E2KM3150W	E2KM3400F	E2K3150T
175	875–1750	E2KM3175W	E2KM3400F	E2K3175T
200	1000–2000	E2KM3200W	E2KM3400F	E2K3200T
225	300–650	E2KM3225AW	E2KM3400F	E2K3225TA
	500–1000	E2KM3225DW	E2KM3400F	E2K3225TD
	1125–2250	E2KM3225W	E2KM3400F	E2K3225T
250	1250–2500	E2KM3250W	E2KM3400F	E2K3250T
300	1500–3000	E2KM3300W	E2KM3400F	E2K3300T
350	1750–3500	E2KM3350W	E2KM3400F	E2K3350T
400	2000–4000	E2KM3400W	E2KM3400F	E2K3400T

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## Molded Case Circuit Breakers

### Specialty Breakers

#### E<sup>2</sup>K/E<sup>2</sup>KM

#### Circuit Breakers with Interchangeable Magnetic Only Trip Unit

2

#### 600 Vac Maximum, 250 Vdc, 35 kA at 480 Vac, Three-Pole

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
400	300–650	E2K3400MAW	E2K3400F	E2K3400TMA
	500–1000	E2K3400MDW	E2K3400F	E2K3400TMD
	625–1250	E2K3400MFW	E2K3400F	E2K3400TMF
	750–1500	E2K3400MGW	E2K3400F	E2K3400TMG
	875–1750	E2K3400MJW	E2K3400F	E2K3400TMJ
	1000–2000	E2K3400MKW	E2K3400F	E2K3400TMK
	1125–2250	E2K3400MLW	E2K3400F	E2K3400TML
	1250–2500	E2K3400MWW	E2K3400F	E2K3400TMW
	1500–3000	E2K3400MNW	E2K3400F	E2K3400TMN
	1750–3500	E2K3400MRW	E2K3400F	E2K3400TMR
	2000–4000	E2K3400MW	E2K3400F	E2K3400TM

#### 1000Y/577 Vac Maximum, 250 Vdc, 14 kA at 1000 Vac, Three-Pole

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
400	300–650	E2KM3250MAW	E2KM3400F	E2K3400TMA
	500–1000	E2KM3400MDW	E2KM3400F	E2K3400TMD
	625–1250	E2KM3400MFW	E2KM3400F	E2K3400TMF
	750–1500	E2KM3400MGW	E2KM3400F	E2K3400TMG
	875–1750	E2KM3400MJW	E2KM3400F	E2K3400TMJ
	1000–2000	E2KM3400MKW	E2KM3400F	E2K3400TMK
	1125–2250	E2KM3400MLW	E2KM3400F	E2K3400TML
	1250–2500	E2KM3400MWW	E2KM3400F	E2K3400TMW
	1500–3000	E2KM3400MNW	E2KM3400F	E2K3400TMN
	1750–3500	E2KM3400MRW	E2KM3400F	E2K3400TMR
	2000–4000	E2KM3400MW	E2KM3400F	E2K3400TM

**E<sup>2</sup>K/E<sup>2</sup>KM****Circuit Breakers with Interchangeable Electronic Trip Unit, Long/Instantaneous**

2

**600 Vac Maximum, 35 kA at 480 Vac, Three-Pole**

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
100	50–800	E2KE3100W	E2K3400F	KEM3100T
125	50–800	E2KE3125W	E2K3400F	KEM3125T
150	50–800	E2KE3150W	E2K3400F	KEM3150T
200	200–1500	E2KE3200W	E2K3400F	KEM3200T
225	200–1500	E2KE3225W	E2K3400F	KEM3225T
	500–2500	E2KE32252W	E2K3400F	KEM3225T2
400	200–1500	E2KE3400W	E2K3400F	KEM3400T
	500–2500	E2KE34002W	E2K3400F	KEM3400T2

**1000Y/577 Vac Maximum, 14 kA at 1000 Vac, Three-Pole**

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
100	50–800	E2KEM3100W	E2KM3400F	KEM3100T
125	50–800	E2KEM3125W	E2KM3400F	KEM3125T
150	50–800	E2KEM3150W	E2KM3400F	KEM3150T
200	200–1500	E2KEM3200W	E2KM3400F	KEM3200T
225	200–1500	E2KEM3225	E2KM3400F	KEM3225T
	500–2500	E2KEM32252W	E2KM3400F	KEM3225T2
400	200–1500	E2KEM3400W	E2KM3400F	KEM3400T
	500–2500	E2KEM34002W	E2KM3400F	KEM3400T2



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## Molded Case Circuit Breakers

### Specialty Breakers

#### E<sup>2</sup>K/E<sup>2</sup>KM

#### Circuit Breakers with Interchangeable Electronic Trip Unit, Instantaneous Only

2

#### 600 Vac Maximum, 35 kA at 480 Vac, Three-Pole

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
150	50–800	E2KE3150MW	E2K3400F	KEM3150TM
225	200–1500	E2KE3225MW	E2K3400F	KEM3225TM
	500–2500	E2KE3225M2W	E2K3400F	KEM3225TM2
400	200–1500	E2KE3400MW	E2K3400F	KEM3400TM
	500–2500	E2KE3400M2W	E2K3400F	KEM3400TM2

#### 1000Y/577 Vac Maximum, 14 kA at 1000 Vac, Three-Pole

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
150	50–800	E2KEM3150MW	E2KM3400F	KEM3150TM
225	200–1500	E2KEM3225MW	E2KM3400F	KEM3225TM
	500–2500	E2KEM3225M2W	E2KM3400F	KEM3225TM2
400	200–1500	E2KEM3400MW	E2KM3400F	KEM3400TM
	500–2500	E2KEM3400M2W	E2KM3400F	KEM3400TM2

**E<sup>2</sup>LME/E<sup>2</sup>LMZ (Series G)****Circuit Breakers with Magnetic Only Trip Unit****600 Vac Maximum, 250 Vdc, 65 kA at 480 Vac, Three-Pole**

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker Catalog Number	Frame Only Catalog Number	Trip Unit Only Catalog Number
400	3600–4400	E2LME3400KMW	E2LME3400NN	LT3400KM

**1000Y/577 Vac Maximum, 250 Vdc, 10 kA at 1000 Vac, Three-Pole**

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker Catalog Number	Frame Only Catalog Number	Trip Unit Only Catalog Number
400	3600–4400	E2LMZ3400KMW	E2LMZ3400NN	LT3400KM

**Circuit Breakers with Interchangeable Electronic Trip Unit****600 Vac Maximum, 65 kA at 480 Vac, Three-Pole**

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker Catalog Number	Frame Only Catalog Number	Trip Unit Only Catalog Number
160	320–1920	E2LME340031W	E2LME3400NN	LT340031M
200	400–2400	E2LME340031W	E2LME3400NN	LT340031M
225	450–2700	E2LME340031W	E2LME3400NN	LT340031M
250	500–3000	E2LME340031W	E2LME3400NN	LT340031M
300	600–3600	E2LME340031W	E2LME3400NN	LT340031M
315	630–3780	E2LME340031W	E2LME3400NN	LT340031M
350	700–4200	E2LME340031W	E2LME3400NN	LT340031M
400	800–4800	E2LME340031W	E2LME3400NN	LT340031M

**1000Y/577 Vac Maximum, 10 kA at 1000 Vac, Three-Pole**

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker Catalog Number	Frame Only Catalog Number	Trip Unit Only Catalog Number
160	320–1920	E2LMZ340031W	E2LMZ3400NN	LT340031M
200	400–2400	E2LMZ340031W	E2LMZ3400NN	LT340031M
225	450–2700	E2LMZ340031W	E2LMZ3400NN	LT340031M
250	500–3000	E2LMZ340031W	E2LMZ3400NN	LT340031M
300	600–3600	E2LMZ340031W	E2LMZ3400NN	LT340031M
315	630–3780	E2LMZ340031W	E2LMZ3400NN	LT340031M
350	700–4200	E2LMZ340031W	E2LMZ3400NN	LT340031M
400	800–4800	E2LMZ340031W	E2LMZ3400NN	LT340031M

E<sup>2</sup>L/E<sup>2</sup>LM

2

**Circuit Breakers with Interchangeable Thermal-Magnetic Trip Unit****600 Vac Maximum, 250 Vdc, 35 kA at 480 Vac, Three-Pole**

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
300	1500–3000	E2L3300W	E2L3600F	E2L3300T
350	1750–3500	E2L3350W	E2L3600F	E2L3350T
400	2000–4000	E2L3400W	E2L3600F	E2L3400T
450	2250–4500	E2L3450W	E2L3600F	E2L3450T
500	2500–5000	E2L3500W	E2L3600F	E2L3500T
600	3000–6000	E2L3600W	E2L3600F	E2L3600T

**1000Y/577 Vac Maximum, 250 Vdc, 18 kA at 1000 Vac, Three-Pole**

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
300	1500–3000	E2LM3300W	E2LM3600F	E2L3300T
350	1750–3500	E2LM3350W	E2LM3600F	E2L3350T
400	2000–4000	E2LM3400W	E2LM3600F	E2L3400T
450	2250–4500	E2LM3450W	E2LM3600F	E2L3450T
500	2500–5000	E2LM3500W	E2LM3600F	E2L3500T
600	3000–6000	E2LM3600W	E2LM3600F	E2L3600T
	1125–2250	—	E2LM3600F	E2L3600TL <sup>①</sup>

**Note**

① 600 ampere thermal 1125–2250 T.A.

E<sup>2</sup>L/E<sup>2</sup>LM*Circuit Breakers with Interchangeable Magnetic Only Trip Unit*

2

**600 Vac Maximum, 250 Vdc, 35 kA at 480 Vac, Three-Pole**

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
600	1125–2250	E2L3600MLW	E2L3600F	E2L3600TML
	1500–3000	E2L3600MNW	E2L3600F	E2L3600TMN
	1750–3500	E2L3600MRW	E2L3600F	E2L3600TMR
	2000–4000	E2L3600MXW	E2L3600F	E2L3600TMX
	2250–4500	E2L3600MYW	E2L3600F	E2L3600TMY
	2500–5000	E2L3600MPW	E2L3600F	E2L3600TMP
	3000–6000	E2L3600MW	E2L3600F	E2L3600TM

**1000Y/577 Vac Maximum, 250 Vdc, 18 kA at 1000 Vac, Three-Pole**

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
600	1125–2250	E2LM3600MLW	E2LM3600F	E2L3600TML
	1500–3000	E2LM3600MNW	E2LM3600F	E2L3600TMN
	1750–3500	E2LM3600MRW	E2LM3600F	E2L3600TMR
	2000–4000	E2LM3600MXW	E2LM3600F	E2L3600TMX
	2250–4500	E2LM3600MYW	E2LM3600F	E2L3600TMY
	2500–5000	E2LM3600MPW	E2LM3600F	E2L3600TMP
	3000–6000	E2LM3600MW	E2LM3600F	E2L3600TM

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## Molded Case Circuit Breakers

### Specialty Breakers

#### E<sup>2</sup>L/E<sup>2</sup>LM

#### Circuit Breakers with Interchangeable Electronic Trip Unit, Long/Instantaneous

2

##### 600 Vac Maximum, 35 kA at 480 Vac, Three-Pole

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
300	500–2500	E2LE3300W	E2L3600F	LEM3300T
350	500–2500	E2LE3350W	E2L3600F	LEM3350T
400	500–2500	E2LE3400W	E2L3600F	LEM3400T
	1000–4000	E2LE34002W	E2L3600F	LEM3400T2
600	500–2500	E2LE3600W	E2L3600F	LEM3600T
	2500–5000	E2LE36002W	E2L3600F	LEM3600T2

##### 1000Y/577 Vac Maximum, 18 kA at 1000 Vac, Three-Pole

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
300	500–2500	E2LEM3300W	E2LM3600F	LEM3300T
350	500–2500	E2LEM3350W	E2LM3600F	LEM3350T
400	500–2500	E2LEM3400W	E2LM3600F	LEM3400T
	1000–4000	E2LEM34002W	E2LM3600F	LEM3400T2
600	500–2500	E2LEM3600W	E2LM3600F	LEM3600T
	2500–5000	E2LEM36002W	E2LM3600F	LEM3600T2

#### Circuit Breakers with Interchangeable Electronic Trip Unit, Instantaneous Only

##### 600 Vac Maximum, 35 kA at 480 Vac, Three-Pole

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
400	500–2500	E2LE3400MW	E2L3600F	LEM3400TM
	1000–4000	E2LE3400M2W	E2L3600F	LEM3400TM2
600	500–2500	E2LE3600MW	E2L3600F	LEM3600TM
	2500–5000	E2LE3600M2W	E2L3600F	LEM3600TM2

##### 1000Y/577 Vac Maximum, 18 kA at 1000 Vac, Three-Pole

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
400	500–2500	E2LEM3400MW	E2LM3600F	LEM3400TM
	1000–4000	E2LEM3400M2W	E2LM3600F	LEM3400TM2
600	500–2500	E2LEM3600MW	E2LM3600F	LEM3600TM
	2500–5000	E2LEM3600M2W	E2LM3600F	LEM3600TM2

E<sup>2</sup>M/E<sup>2</sup>MM

*Circuit Breaker with Interchangeable Thermal-Magnetic Trip Unit*

**600 Vac Maximum, 250 Vdc, 35 kA at 480 Vac, Three-Pole**

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
600	1500–3000	E2M3600W	E2M3800F	E2M3600TN
800	2000–4000	E2M3800W	E2M3800F	E2M3800TX

E<sup>2</sup>M/E<sup>2</sup>MM



**1000Y/577 Vac Maximum, 250 Vdc, 18 kA at 1000 Vac, Three-Pole**

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
600	1500–3000	E2MM3600W	E2MM3800F	E2M3600TN
800	2000–4000	E2MM3800W	E2MM3800F	E2M3800TX

*Circuit Breaker with Interchangeable Magnetic Only Trip Unit*

**600 Vac Maximum, 250 Vdc, 35 kA at 480 Vac, Three-Pole**

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
800	1500–3000	E2M3800MNW	E2M3800F	E2M3800TMN
	2000–4000	E2M3800MXW	E2M3800F	E2M3800TMX
	2500–5000	E2M3800MPW	E2M3800F	E2M3800TMP
	3000–6000	E2M3800MWW	E2M3800F	E2M3800TMW

**1000Y/577 Vac Maximum, 250 Vdc, 18 kA at 1000 Vac, Three-Pole**

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
800	1500–3000	E2MM3800MNW	E2MM3800F	E2M3800TMN
	2000–4000	E2MM3800MXW	E2MM3800F	E2M3800TMX
	2500–5000	E2MM3800MPW	E2MM3800F	E2M3800TMP
	3000–6000	E2MM3800MWW	E2MM3800F	E2M3800TMW

# 2.6

## Molded Case Circuit Breakers

### Specialty Breakers

#### E<sup>2</sup>M/E<sup>2</sup>MM

2

#### *Circuit Breaker with Interchangeable Electronic Trip Unit, Long/Instantaneous*

##### 600 Vac Maximum, 35 kA at 480 Vac, Three-Pole

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
800	500–2500	E2ME3800W	E2M3800F	MEM3800T
	1000–4000	E2ME38002W	E2M3800F	MEM3800T2

##### 1000Y/577 Vac Maximum, 18 kA at 1000 Vac, Three-Pole

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
800	500–2500	E2MEM3800W	E2MM3800F	MEM3800T
	1000–4000	E2MEM38002W	E2MM3800F	MEM3800T2

#### *Circuit Breaker with Interchangeable Electronic Trip Unit, Instantaneous Only*

##### 600 Vac Maximum, 35 kA at 480 Vac, Three-Pole

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
800	500–2500	E2ME3800MW	E2M3800F	MEM3800TM
	1000–4000	E2ME3800M2W	E2M3800F	MEM3800TM2

##### 1000Y/577 Vac Maximum, 18 kA at 1000 Vac, Three-Pole

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Complete Breaker	Frame Only	Trip Unit Only
		Catalog Number	Catalog Number	Catalog Number
800	500–2500	E2MEM3800MW	E2MM3800F	MEM3800TM
	1000–4000	E2MEM3800M2W	E2MM3800F	MEM3800TM2

**E<sup>2</sup>N/E<sup>2</sup>NM*****Circuit Breakers with Electronic Trip Unit, Long/Instantaneous***

2

**600 Vac Maximum, 50 kA at 480 Vac, Three-Pole Frame**

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Catalog Number
400	500–2500	E2N3400W
500	500–2500	E2N3500W
600	500–2500	E2N3600W
700	500–2500	E2N3700W
800	500–2500	E2N3800W
900	1250–5000	E2N3900W
1000	1250–5000	E2N310W
1200	1250–5000	E2N312W

**1000Y/577 Vac Maximum, 25 kA at 1000 Vac, Three-Pole Frame**

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Catalog Number
400	500–2500	E2NM3400W
500	500–2500	E2NM3500W
600	500–2500	E2NM3600W
700	500–2500	E2NM3700W
800	500–2500	E2NM3800W
900	1250–5000	E2NM3900W
1000	1250–5000	E2NM310W
1200	1250–5000	E2NM312W

***Circuit Breakers with Electronic Trip Unit, Instantaneous Only*****600 Vac Maximum, 50 kA at 480 Vac, Three-Pole Frame**

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Catalog Number
800	500–2500	E2N3800MW
1200	1250–5000	E2N312MW

**1000Y/577 Vac Maximum, 25 kA at 1000 Vac, Three-Pole Frame**

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Catalog Number
800	500–2500	E2NM3800MW
1200	1250–5000	E2NM312MW



**E<sup>2</sup>R/E<sup>2</sup>RM****Circuit Breakers with Electronic Trip Unit, Long/Instantaneous (Does Not Include Rating Plugs)** <sup>①</sup>

2

**600 Vac Maximum, 50 kA at 480 Vac, Three-Pole Frame**

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Catalog Number
<b>LS</b>		
1600	2–8 x I <sub>n</sub>	E2R316T33W
2000	2–8 x I <sub>n</sub>	E2R320T33W
<b>LSI</b>		
1600	2–8 x I <sub>n</sub>	E2R316T32W
2000	2–8 x I <sub>n</sub>	E2R320T32W

**1000Y/577 Vac Maximum, 25 kA at 1000 Vac, Three-Pole Frame**

Maximum Continuous Ampere Rating at 40°C	Magnetic Trip Range	Catalog Number
<b>LS</b>		
1600	2–8 x I <sub>n</sub>	E2RM316T33W
2000	2–8 x I <sub>n</sub>	E2RM320T33W
<b>LSI</b>		
1600	2–8 x I <sub>n</sub>	E2RM316T32W
2000	2–8 x I <sub>n</sub>	E2RM320T32W

**Note**

<sup>①</sup> Rating plugs: 1600 amperes **16RES16T**; 2000 amperes **20RES20T**.

## Accessories

## Line and Load Terminals

Breaker Type	Maximum Breaker Amperes	Wire Type	AWG Wire Range (No. Conductors)	Catalog Number
E <sup>2</sup> F/E <sup>2</sup> FM	100	Cu/Al	#14–1/0 (1)	<b>3T100FB</b> (package of three)
	150	Cu	#4–4/0 (1)	<b>3T150FB</b> (package of three)
E <sup>2</sup> J/E <sup>2</sup> JM	250	Cu	#4–350 (1)	<b>T250KB</b>
E <sup>2</sup> K/E <sup>2</sup> KM	225	Cu	#3–350 (1)	<b>T300K</b>
	350	Cu	250–500 (1)	<b>T350K</b>
	400	Cu	2/0–250 (2)	<b>3T400K</b> (three-pole kit)
E <sup>2</sup> LME/E <sup>2</sup> LMZ	400	Cu/Al	500–750 (1)	<b>3TA631LK</b>
E <sup>2</sup> L/E <sup>2</sup> LM	400	Cu/Al	4/0–600 (1)	<b>3TA401LDK</b> (three-pole kit)
	600	Cu	250–350 (2)	<b>T602LD</b>
E <sup>2</sup> M/E <sup>2</sup> MM	600	Cu	(2) 2/0–500 kcmil	<b>T600MA1</b>
	600	Cu/Al	(2) 1–500 kcmil	<b>TA700MA1</b>
	800 std.	Cu/Al	(3) 3/0–400 kcmil	<b>TA800MA2</b>
	800	Cu/Al	(2) 500–750 kcmil	<b>TA801MA</b>
	800	Cu	(3) 3/0–300 kcmil	<b>T800MA1</b>
E <sup>2</sup> N/E <sup>2</sup> NM	700	Cu	2/0–500 (2)	<b>T700NB1</b>
	1000	Cu	3/0–500 (3)	<b>T1000NB1</b>
	1200	Cu	3/0–400 (4)	<b>T1200NB3</b>
	1600	Cu/Al	500–1000 (4)	<b>TA1600RD</b>
	2000	Cu/Al	2–600 (6)	<b>TA2000RD</b>

## End Cap Terminals—For Use with Ring Type Terminals

Breaker Type	Maximum Breaker Amperes	Catalog Number	Metric Catalog Number	Imperial
E <sup>2</sup> F/E <sup>2</sup> FM	150	<b>KPEK1</b>	<b>KPEMK1</b>	—
E <sup>2</sup> J/E <sup>2</sup> JM	250	<b>KPEK2</b>	<b>KPEMK2</b>	—
E <sup>2</sup> K/E <sup>2</sup> KM	400	<b>KPEK3</b>	<b>KPEMK3</b>	—
E <sup>2</sup> LME/E <sup>2</sup> LMZ	400	—	<b>L3RTWK</b>	—
E <sup>2</sup> L/E <sup>2</sup> LM	600	<b>KPEK4</b>	<b>KPEMK4</b>	—

## External Accessories

## Padlockable Handle Lock Hasp

Breaker Type	Catalog Number
E <sup>2</sup> F/E <sup>2</sup> FM	<b>PLK1</b>
E <sup>2</sup> J/E <sup>2</sup> JM	<b>PLK3</b>
E <sup>2</sup> K/E <sup>2</sup> KM	<b>PLK3</b>
E <sup>2</sup> LME/E <sup>2</sup> LMZ	<b>LPHL</b>
E <sup>2</sup> L/E <sup>2</sup> LM	<b>HLK4</b>
E <sup>2</sup> M/E <sup>2</sup> MM	<b>HLK4</b>
E <sup>2</sup> N/E <sup>2</sup> NM	<b>PLK5</b>
E <sup>2</sup> R/E <sup>2</sup> RM	<b>HLK6</b>

## Internal Accessories

Undervoltage Release <sup>①</sup>

Breaker Type	UVR Type	Voltage Rating	Mounting Location	Catalog Number	Factory Modification Code
E <sup>2</sup> F/E <sup>2</sup> FM	Handle reset	208–240 Vac	Left pole	<b>UVH1LP11K</b> (thermal/magnetic only) <sup>②</sup>	U18
	Handle reset	110–127 Vdc	Left pole	<b>UVH1LP26K</b> (thermal/magnetic only) <sup>②</sup>	U42
E <sup>2</sup> J/E <sup>2</sup> JM	Handle reset	110–127 Vac	Left pole	<b>UVH2LP08K</b> <sup>②</sup>	U18
	Handle reset	208–240 Vac	Left pole	<b>UVH2LP11K</b> <sup>②</sup>	U22
	Handle reset	110–125 Vdc	Left pole	<b>UVH2LP26K</b> <sup>②</sup>	T14
E <sup>2</sup> K/E <sup>2</sup> KM	120 volt handle reset with LED	120 Vac	Left pole	<b>UVM3LP08K</b> <sup>②③</sup>	U66
	120 volt handle reset with LED	120 Vac	Left pole	<b>UVM3LP08KT</b> <sup>②④</sup>	U68
	Handle reset	110–127 Vac	Left pole	<b>UVH3LP08K</b> <sup>②</sup>	U18
	Handle reset	208–240 Vac	Left pole	<b>UVH3LP11K</b> <sup>②</sup>	U22
	Handle reset	110–125 Vdc	Left pole	<b>UVH3LP26K</b> <sup>②</sup>	T14
E <sup>2</sup> LME/E <sup>2</sup> LMZ	Handle reset	110–127 Vac	Left pole	<b>UVR120APK</b>	U5
	Handle reset	110–125 Vdc	Left pole	<b>UVR125DPK</b>	U6
E <sup>2</sup> L/E <sup>2</sup> LM/E <sup>2</sup> M/E <sup>2</sup> MM	120 volt handle reset with LED	120 Vac	Left pole	<b>UVM4LP08K</b> <sup>②③</sup>	U66
	120 volt handle reset with LED	120 Vac	Left pole	<b>UVM4LP08KT</b> <sup>②④</sup>	U68
	Handle reset	110–127 Vac	Left pole	<b>UVH4LP08K</b> <sup>②</sup>	U18
	Handle reset	208–240 Vac	Left pole	<b>UVH4LP11K</b> <sup>②</sup>	U22
	Handle reset	110–125 Vdc	Left pole	<b>UVH4LP26K</b> <sup>②</sup>	T14
E <sup>2</sup> N/E <sup>2</sup> NM	120 volt handle reset with LED	120 Vac	Left pole	<b>UVM5LP08K</b> <sup>③</sup>	U66
	120 volt handle reset with LED	120 Vac	Left pole	<b>UVM5LT08K</b> <sup>④</sup>	U68
	Handle reset	110–127 Vac	Left pole	<b>UVH5LP08K</b> <sup>②</sup>	U18
	Handle reset	208–240 Vac	Left pole	<b>UVH5LP11K</b> <sup>②</sup>	U22
	Handle reset	110–125 Vdc	Left pole	<b>UVH5LP26K</b> <sup>②</sup>	T14
E <sup>2</sup> R/E <sup>2</sup> RM	120 volt handle reset with LED	120 Vac	Right pole	<b>UVM6RP08K</b> <sup>③⑤</sup>	U58
	Handle reset	110–127 Vac	Right pole	<b>UVH6RP08K</b> <sup>⑤</sup>	U49
	Handle reset	208–240 Vac	Right pole	<b>UVH6RP11K</b> <sup>⑤</sup>	U53
	Handle reset	110–125 Vdc	Right pole	<b>UVH6RP26K</b> <sup>⑤</sup>	T33

**Notes**

- ① Contact Eaton for internal accessory voltage ratings not listed.
- ② LH (RH also available).
- ③ Pigtail leads.
- ④ Terminal blocks.
- ⑤ RH only.

## Shunt Trip ①

Breaker Type	Voltage Rating	Mounting Location	Catalog Number	Factory Modification Code
E <sup>2</sup> F/E <sup>2</sup> FM	48–127 Vac or 48–60 Vdc	Left pole	<b>SNT1LP08K</b> ②	S06
	208–230 Vac or 110–127 Vdc	Left pole	<b>SNT1LP12K</b> ②	S10
E <sup>2</sup> J/E <sup>2</sup> JM	110–240 Vac or 110–125 Vdc	Left pole	<b>SNT2P11K</b> ③	S10
E <sup>2</sup> K/E <sup>2</sup> KM	110–240 Vac or 110–125 Vdc	Left pole	<b>SNT3P11K</b> ③	S10
E <sup>2</sup> LME/E <sup>2</sup> LMZ	24–60 Vac/dc	Left pole	<b>SNT060CPK</b>	S1
	110–240 Vac/dc	Left pole	<b>SNT120CPK</b>	S2
E <sup>2</sup> L/E <sup>2</sup> LM/E <sup>2</sup> M/E <sup>2</sup> MM	48–60 Vac	Left pole	<b>SNT4LP05K</b> ②	S06
	48–60 Vdc	Left pole	<b>SNT4LP23K</b> ②	S86
	110–240 Vac	Left pole	<b>SNT4LP11K</b> ②	S10
	110–125 Vdc	Left pole	<b>SNT4LP26K</b> ②	S42
E <sup>2</sup> N/E <sup>2</sup> NM	110–240 Vac	Left pole	<b>SNT5LP11K</b> ②	S10
	110–125 Vdc	Left pole	<b>SNT5LP26K</b> ②	S42
E <sup>2</sup> R/E <sup>2</sup> RM	110–240 Vac	Right pole	<b>SNT6P11K</b> ④	S29
	110–125 Vdc	Right pole	<b>SNT6P26K</b> ④	S45

## Auxiliary Switch

Breaker Type	Number of Sets of Contacts (1A and 1B)	Mounting Location	Catalog Number	Factory Modification Code
E <sup>2</sup> F/E <sup>2</sup> FM	1	Right	<b>A1X1PK</b>	A06
	2	Right	<b>A2X1RPK</b>	A13
E <sup>2</sup> J/E <sup>2</sup> JM	1	Right	<b>A1X2PK</b>	A06
	2	Right	<b>A2X2PK</b>	A13
E <sup>2</sup> K/E <sup>2</sup> KM	1	Right	<b>A1X3PK</b>	A06
	2	Right	<b>A2X3PK</b>	A13
E <sup>2</sup> LME/E <sup>2</sup> LMZ	1	Right	<b>AUX1A1BPK</b>	A1
	2	Right	<b>AUX2A2BPK</b>	A2
E <sup>2</sup> L/E <sup>2</sup> LM/E <sup>2</sup> M/E <sup>2</sup> MM	1	Right	<b>A1X4PK</b>	A06
	2	Right	<b>A2X4PK</b>	A13
E <sup>2</sup> N/E <sup>2</sup> NM	1	Right	<b>A1X5PK</b>	A06
	2	Right	<b>A2X5PK</b>	A13
E <sup>2</sup> R/E <sup>2</sup> RM	2	Right	<b>A2X6RPK</b>	A12
	4	Right	<b>A4X6RPK</b>	A19

## Alarm (Signal/Lockout Switch)

Breaker Type	Number of Sets of Contacts (Make and Break)	Mounting Location	Catalog Number	Factory Modification Code
E <sup>2</sup> F/E <sup>2</sup> FM	1	Right	<b>A1L1LPK/A1L1RPK</b>	B06
	2	Right	<b>A2L1LPK/A2L1RPK</b>	B13
E <sup>2</sup> J/E <sup>2</sup> JM	1	Right	<b>A1L2LPK/A1L2RPK</b>	B06
E <sup>2</sup> K/E <sup>2</sup> KM	1	Right	<b>A1L3LPK/A1L3RPK</b>	B06
	2	Right	<b>A2L3LPK/A2L3RPK</b>	B13
E <sup>2</sup> LME/E <sup>2</sup> LMZ	1	Right	<b>ALM1M1B1BPK</b>	B1
	2	Right	<b>ALM2M2B1BPK</b>	B3
E <sup>2</sup> L/E <sup>2</sup> LM/E <sup>2</sup> M/E <sup>2</sup> MM	1	Right	<b>A1L4LPK/A1L4RPK</b>	B06
	2	Right	<b>A2L4LPK/A2L4RPK</b>	B13
E <sup>2</sup> N/E <sup>2</sup> NM	1	Right	<b>A1L5LPK/A1L5RPK</b>	B06
	2	Right	<b>A2L5LPK/A2L5RPK</b>	B13
E <sup>2</sup> R/E <sup>2</sup> RM	1	Right	<b>A1L6RPK</b>	B05
	2	Right	<b>A2L6RPK</b>	B12

## Notes

- ① Contact Eaton for internal accessory voltage ratings not listed.
- ② LH (RH also available).
- ③ LH or RH.
- ④ RH only.

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### Classic Mining Breakers

#### Product Overview

Classic mining service circuit breakers continue to be manufactured and are primarily applied to achieve an exact physical and electronic replacement of previously Cutler-Hammer

installed Westinghouse equipment. To upgrade to the current offering of E<sup>2</sup> mining circuit breakers, consult the cross reference information on **Page V4-T2-399**.

#### AC Interrupting Capacity, Symmetrical Amperes

60 Hz AC Volts	Breaker Type				All Other 1000 Volt Breakers <sup>②</sup>
	KAM	LAM, MAM, NBM	HKAM	HLAM <sup>②</sup>	
240	25,000	42,000	—	—	—
480	22,000	30,000	—	—	—
600	22,000	22,000	—	—	—
1000 <sup>①</sup>	—	—	10,000	12,000	14,000

#### Special DC Interrupting Capacity

Breaker Type	Maximum Ampere Rating	Interrupting Capacity (Amperes) at 300–330 Vdc			
		Single-Pole		Two Poles in Series <sup>④</sup>	
		0.0–0.15 mH Inductance <sup>③</sup>	0.15–0.5 mH Inductance	0.5–0.9 mH Inductance	2.4 mH Inductance
KAM	225	15,000	10,000	15,000	5000
LAM	400/600	15,000	10,000	15,000	5000
MAM	800	15,000	10,000	15,000	5000
NBM	1200	15,000	10,000	15,000	5000

#### Notes

- ① Based on circuit power factor of 50% or greater.
- ② HLAM must be rear stud connected. If front connected, interrupting capacity rating is 10,000 amperes.
- ③ Resistive circuit.
- ④ Two poles in electrical series in ungrounded leg of circuit.

**Classic Circuit Breakers For Mining Service****Undervoltage Release Data**

Undervoltage releases are calibrated to pick up at 72 to 85% of rated voltage dropout between 35 to 70% of rated voltage.

Breaker Type	Volts	Line Amperes	Series Resistors <sup>①</sup>	Total VA
KAM, HKAM <sup>①</sup>	480/60	0.021	10,000	10.1
	240/60	0.019	—	4.6
	120/60	0.021	—	2.5
	120/60 <sup>②</sup>	0.13	—	15.6
LAM, HLAM, MAM, HMAM, NBM, HNB M <sup>①</sup>	480/60	0.033	12,000 <sup>③</sup>	15.9
	240/60	0.028	6,000	6.7
	120/60	0.029	—	3.5
	120/60 <sup>②</sup>	0.13	—	15.6

**Shunt Trip Coil Data**

Breaker Type	Volts	Amperes	VA
KAM, HKAM, LAM, HLAM, MAM, HMAM, NBM, HNB M	480/60	0.085	40.8
	240/60	1.7	408
	120/60	0.88	105.6
	48 DC	8.0	384

**Notes**

- ① Supplied for external customer mounting.
- ② New design electrical reset UVR.
- ③ 16,000 for Type MAM and HMAM.

**Product Selection**

For reference only. Replace these frames with E2 Series. See Cross-Reference information beginning on **Page V4-T2-399**.

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**Classic Mining Service Circuit Breakers**

Breaker Type	Frame Style Numbers <sup>①②</sup>	Poles	Amperes	Trip Type	Accessories (Included in Frame)	Magnetic Trip Range, Amperes <sup>③</sup>
KAM	2609D60G64	2	180	M	None	200–400
	1291C26G07	2	180	M	UVR <sup>④</sup>	200–400
	2609D60G66	2	180	M	Standard shunt trip <sup>③</sup>	200–400
	1291C26G01	2	225	TM	UVR <sup>④</sup>	300–700
	1291C26G02	2	225	TM	UVR <sup>④</sup>	500–1000
	2609D60G67	3	180	M	None	200–400
	1291C26G08	3	180	M	UVR <sup>④</sup>	200–400
	2609D60G69	3	180	M	Standard shunt trip <sup>③</sup>	200–400
	5685D48G75	3	225	TM	None	300–700
	5685D48G74	3	225	TM	None	500–1000
	1291C26G03	3	225	TM	UVR <sup>④</sup>	300–700
	1291C26G04	3	225	TM	UVR <sup>④</sup>	500–1000
	2609D60G01	3	225	TM	Standard shunt trip <sup>③</sup>	300–700
	2609D60G02	3	225	TM	Standard shunt trip <sup>③</sup>	500–1000
	2609D60G40	3	225	M	None	300–700
	2609D60G41	3	225	M	None	500–700
	1291C26G05	3	225	M	UVR <sup>④</sup>	300–700
	1291C26G06	3	225	M	UVR <sup>④</sup>	500–1000
LAM	1291C32G01	2	400	TM	UVR <sup>④</sup>	500–1000
	2609D60G61	2	400	M	Shunt trip (48 Vdc)	750–1500
	1291C32G03	3	400	TM	UVR <sup>④</sup>	500–1000
	5685D48G73	3	400	TM	None	800–1600
	1291C32G02	3	400	TM	UVR <sup>④</sup>	800–1600
	2609D60G03	3	400	TM	Standard shunt trip <sup>③</sup>	800–1600
	2609D60G44	3	400	M	None	800–1600
	1291C32G04	3	400	M	UVR <sup>④</sup>	800–1600

**Notes**

- ① Terminals not included in style number.  
 ② All breakers listed are complete with accessories indicated.  
 ③ Rated 120 volts/60 Hz; undervoltage release is handle reset type.  
 ④ UVR is auto-reset type, 120 Vac.

M = magnetic only; TM = thermal-magnetic.

For reference only. Replace these frames with E2 Series. See Cross-Reference information beginning on **Page V4-T2-399**.

### Classic Mining Service Circuit Breakers, continued

Breaker Type	Frame Style Numbers <sup>①②</sup>	Poles	Amperes	Trip Type	Accessories (Included in Frame)	Magnetic Trip Range, Amperes <sup>③</sup>
MAM	2609D60G17	2	600	TM	UVR <sup>③</sup>	750–1500
	2609D60G18	2	800	TM	UVR <sup>③</sup>	1000–2000
	2609D60G63	3	400	TM	UVR <sup>③</sup>	2000–4000
	5685D48G72	3	600	TM	None	1500–3000
	2609D60G19	3	600	TM	UVR <sup>③</sup>	1500–3000
	2609D60G04	3	600	TM	Standard shunt trip <sup>③</sup>	1500–3000
	2609D60G05	3	800	TM	Standard shunt trip <sup>③</sup>	2000–4000
	5685D48G71	3	800	TM	None	2000–4000
	2609D60G20	3	800	TM	UVR <sup>③</sup>	2000–4000
	2609D60G46	3	800	M	None	1500–3000
	2609D60G47	3	800	M	UVR <sup>③</sup>	1500–3000
	2609D60G48	3	800	M	None	2000–4000
	2609D60G49	3	800	M	UVR <sup>③</sup>	2000–4000
NBM	1229C37G13	2	1000	TM	UVR <sup>④</sup>	1500–3000
	1229C37G14	2	1200	TM	UVR <sup>④</sup>	2000–4000
	1227C36G10	3	1000	TM	None	2500–5000
	1229C37G15	3	1000	TM	UVR <sup>④</sup>	2500–5000
	1227C36G13	3	1000	TM	Standard shunt trip <sup>③</sup>	2500–5000
	1227C36G14	3	1200	TM	Standard shunt trip <sup>③</sup>	2500–5000
	1227C36G09	3	1200	TM	None	2500–5000
	1229C37G16	3	1200	TM	UVR <sup>④</sup>	2500–5000
	1227C36G19	3	1200	M	None	2500–5000
	1229C37G17	3	1200	M	UVR <sup>④</sup>	2500–5000

#### Notes

- ① Terminals not included in style number.
- ② All breakers listed are complete with accessories indicated.
- ③ Rated 120 volts/60 Hz: undervoltage release is handle reset type.
- ④ UVR is auto-reset type, 120 Vac.

M = magnetic only; TM = thermal-magnetic.






# 2.6

## Molded Case Circuit Breakers

### Specialty Breakers

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#### 1000 Volt Classic Mining Service Circuit Breakers

Breaker Type	Frame Style Numbers	Poles	Amperes	Trip Type	Accessories (Included in Frame)	Magnetic Trip Range, Amperes <sup>①</sup>	
<b>HKAM</b> 	HKAM	<b>2609D60G70</b>	3	180	M	None	200–400
		<b>1291C26G16</b>	3	180	M	UVR <sup>②</sup>	200–400
		<b>5685D48G87</b>	3	225	TM	None	300–700
		<b>1291C26G12</b>	3	225	TM	UVR <sup>②</sup>	300–700
		<b>5685D48G86</b>	3	225	TM	None	500–1000
		<b>1291C26G13</b>	3	225	TM	UVR <sup>②</sup>	500–1000
		<b>1291C26G14</b>	3	225	M	UVR <sup>②</sup>	300–700
		<b>1291C26G15</b>	3	225	M	UVR <sup>②</sup>	500–1000
<b>HLAM</b> 	HLAM	<b>5685D48G85</b>	3	400	TM	None	800–1600
		<b>1291C32G07</b>	3	400	TM	UVR <sup>②</sup>	800–1600
		<b>1291C32G09</b>	3	400	M	UVR <sup>②</sup>	800–1600
<b>HMAM</b> 	HMAM	<b>5685D48G84</b>	3	600	TM	None	1500–3000
		<b>2609D60G28</b>	3	600	TM	UVR <sup>③</sup>	1500–3000
		<b>5685D48G83</b>	3	800	TM	None	2000–4000
		<b>2609D60G29</b>	3	800	TM	UVR <sup>③</sup>	2000–4000
		<b>2609D60G57</b>	3	800	M	UVR <sup>③</sup>	1500–3000
		<b>2609D60G58</b>	3	800	M	UVR <sup>③</sup>	2000–4000
<b>HNAM</b> 	HNBM	<b>1227C36G12</b>	3	1000	TM	None	2500–5000
		<b>1229C37G19</b>	3	1000	TM	UVR <sup>②</sup>	2500–5000
		<b>1227C36G11</b>	3	1200	TM	None	2500–5000
		<b>1229C37G20</b>	3	1200	TM	UVR <sup>②</sup>	2500–5000
		<b>1229C37G18</b>	3	1200	M	UVR <sup>②</sup>	2500–5000

#### Notes

- ① The magnetic trip range does not change when rating plug is changed.
  - ② 120 volt, 60 Hz electrical reset type.
  - ③ Rated 120 volts, 60 Hz; undervoltage release is handle reset type.
- M = magnetic only; TM = thermal-magnetic.

## Classic Mining Service Breaker Frames Only

Breaker Type	Frame Size, Amperes	Number of Poles	Style Numbers
KAM ①	225	2	2602D86G11
	225	3	2602D86G12
KAMH ①	225	2	2602D86G13
	225	3	2602D86G14
HKAM ①	225	3	1264C99G05
LAM ②	400	2	2602D99G05
	400	3	2602D99G06
LAMH ②	400	2	2602D99G07
	400	3	2602D99G08
HLAM ②	400	3	1264C99G02
LAM3600F	600	3	2603D48G07
LAMH3600F	600	3	2603D48G08
HLAM3600F	600	3	2603D48G09

Breaker Type	Frame Size, Amperes	Number of Poles	Style Numbers
MAM ②	800	2	2600D43G11
	800	3	2600D43G12
MAMH ②	800	2	2600D43G13
	800	3	2600D43G14
HMAM ②	800	3	1264C99G03
NBM ②	1200	2	2610D64G07
	1200	3	2610D64G08
NBMH ②	1200	2	2610D64G09
	1200	3	2610D64G10
HNBM ②	1200	3	2610D64G13

## Trip Units for Classic Mining Circuit Breakers

Breaker Type	Conductor Size	Magnetic Trip Range, Amperes	Maximum Continuous Amperes	Thermal-Magnetic Three-Pole ③ Style Numbers	Magnetic Only Three-Pole Style Numbers
HKAM	#6	150–400	180	—	2609D99G22
	#4–#3	300–700	225	5685D48G40	2611D75G01
	#4–#1	500–1000	225	5685D48G34	2611D75G02
HLAM	#4–#1	750–1500	400	5685D48G97	2609D99G21
	#2–#2/0	800–1600	400	5685D48G28	2611D75G03
HLAM600	#2–2/0	750–1500	600	2609D99G20	—
	2/0–500 kcmil	1500–3000	600	2609D99G19	—
HMAM	#2–#2/0	750–1500	600	—	—
	2/0–500 kcmil	1500–3000	600	5685D48G22	2611D75G04 ④
	#1–3/0	1000–2000	800	—	—
	3/0–500 kcmil	2000–4000	800	5685D48G16	2611D75G05
HNBM	2/0–500 kcmil	1500–3000	1000	—	—
	4/0–500 kcmil	2500–5000	1000	5685D48G10	—
	3/0–500 kcmil	2000–4000	1200	—	—
	4/0–500 kcmil	2500–5000	1200	5685D48G04	2611D75G07

## Notes

- ① Frame modified for left-hand mounting of UVR attachment.  
 ② Frame modified for right-hand mounting of UVR attachment.  
 ③ Three-pole trip units only are suitable for replacement in 1000 volt mining service circuit breakers.  
 ④ 800 amperes.

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## Molded Case Circuit Breakers

### Specialty Breakers

#### Terminals For Classic Mining Service Breakers

Terminals are UL listed for wire type and range listed below. When used with aluminum conductors, use joint compound.

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Breaker Type	Terminal Type	Maximum Amperes	Package of 3 Line Terminals Style Number	Wire Range, Type
FBM, HFBM	Style pressure type terminals	100	<b>624B100G02</b>	#14–1/0 Al/Cu
	Optional Al/Cu pressure terminals	50	<b>624B100G10</b>	#14–#4 Al/Cu
		100	<b>624B100G17</b>	#4–4/0 Al/Cu

#### Terminals For Mining Service Breakers

Breaker Type	Terminal Type	Maximum Amperes	Terminal Catalog Number	Wire Range, Type Number of Cables
KAM, HKAM	Standard pressure terminals (copper only)	225	<b>T225LA</b>	(1) #6–350 kcmil
	Optional Al/Cu pressure terminals	225	<b>TA225LA1</b>	(1) #6–350 kcmil Cu, or (1) #4–350 kcmil Al
LAM	Standard copper pressure terminals	225	<b>T225LA</b>	(1) #6–350 kcmil Cu
		400	<b>T401LA</b>	(1) #4–250 kcmil Cu plus (1) 3/0–600 kcmil Cu
	Optional Al/Cu pressure terminals	225	<b>TA225LA1</b>	(1) #6–350 kcmil Cu, or (1) #4–350 kcmil Al
		400	<b>TA400LA1</b>	(1) #4–250 kcmil Al/Cu, plus (1) 3/0–600 kcmil Al/Cu
		400	<b>TA401LA</b>	(1) 600–750 kcmil Al
LAM-600, LAMH-600, HLAM-600	Standard copper pressure terminals	600	<b>T600LA</b>	(2) 250–500 kcmil Cu
	Optional Al/Cu pressure terminals	600	<b>TA600LA</b>	(2) 250–500 kcmil Al/Cu
MAM, HMAM, MAMH	Standard copper pressure terminals	350	<b>T350MA</b>	(1) #1–600 kcmil Cu
		600	<b>T600MA1</b>	(2) 2/0–500 kcmil Cu
		800	<b>T800MA1</b>	(3) 3/0–300 kcmil Cu
	Optional Al/Cu pressure terminals	600	<b>TA700MA1</b>	(2) #1–500 kcmil Al/Cu
		800	<b>TA800MA2</b>	(3) 3/0–400 kcmil Al/Cu
		800	<b>TA801MA</b>	(2) 500–750 kcmil Al/Cu
NBM, HNBM, NBMH	Standard copper pressure terminals	1000	<b>T1000NB1</b>	(3) 3/0–500 kcmil Cu
		1200	<b>T1200NB1</b>	(4) 3/0–400 kcmil Cu
	Optional Al/Cu pressure terminals	1000	<b>TA1000NB1</b>	(3) 3/0–400 kcmil Al/Cu
		1200	<b>TA1200NB1</b>	(4) 4/0–500 kcmil Al/Cu
		1200	<b>TA1201NB1</b>	(3) 500–750 kcmil Al/Cu

## Accessories

### Classic Mining Circuit Breakers

#### Rear Connected Studs <sup>①</sup>

For complete stud assembly, order a stud and tube based on thickness of customer's mounting panel. A short stud must be assembled adjacent to a long stud to maintain

clearances required by Underwriters Laboratories.<sup>②</sup> Two studs required per pole. For List Prices, see Eaton's Price and Availability Digest.

Mounting Panel Thickness In Inches (mm)	Stud		Tube Length In Inches (mm)	Style Numbers
	Length	Style Numbers		
<b>KAM, HKAM Breakers</b>				
0.75 (19.1)–1.00 (25.4)	Short	<b>656D565G01</b>	0.84 (21.3)	<b>456D983H05</b>
	Long	<b>656D565G02</b>	3.78 (96.0)	<b>456D983H08</b>
0.50 (12.7)–0.75 (19.1)	Short	<b>656D565G01</b>	1.09 (27.7)	<b>456D983H06</b>
	Long	<b>656D565G02</b>	4.03 (102.4)	<b>456D983H09</b>
0.25 (6.4)–0.50 (12.7)	Short	<b>656D565G01</b>	1.34 (34.0)	<b>456D983H07</b>
	Long	<b>656D565G02</b>	4.28 (108.7)	<b>456D983H10</b>

#### Rear Connected Studs For Insulated Panels Only: Two Per Pole

Stud Ampere Number	Diameter, In Inches (mm) and Thread	Extension Back of Breaker In Inches (mm)	Stud Style Numbers
<b>LAM, HLAM Breakers</b>			
225 <sup>③</sup>	0.50 (12.7)–13	3.22 (81.8)	<b>1241 345</b>
	0.50 (12.7)–13	6.28 (159.5)	<b>1241 346</b>
	0.50 (12.7)–13	4.97 (126.2)	<b>1241 392</b>
400 <sup>③</sup>	0.75 (19.1)–16	5.47 (138.9)	<b>05B7383G22</b>
	0.75 (19.1)–16	7.97 (202.4)	<b>05B7383G23</b>
	0.75 (19.1)–16	10.47 (265.9)	<b>05B7383G24</b>
600	1.00 (25.4)–12	5.91 (150.1)	<b>314C960G16</b>
	1.00 (25.4)–12	8.41 (213.6)	<b>314C960G17</b>
	1.00 (25.4)–12	10.91 (277.1)	<b>314C960G18</b>
<b>MAM, HMAM, MAMH Breakers</b>			
225	0.50 (12.7)–13	3.66 (93.0)	<b>314C960G01</b>
400	0.75 (19.1)–16	5.91 (150.1)	<b>314C960G04</b>
	0.75 (19.1)–16	8.41 (213.6)	<b>314C960G05</b>
	0.75 (19.1)–16	10.91 (277.1)	<b>314C960G06</b>
600	1.00 (25.4)–12	5.91 (150.1)	<b>314C960G07</b>
	1.00 (25.4)–12	8.41 (213.6)	<b>314C960G08</b>
	1.00 (25.4)–12	10.91 (277.1)	<b>314C960G09</b>
800	1.13 (28.7)–12	4.91 (124.7)	<b>314C960G10</b>
	1.13 (28.7)–12	8.41 (213.6)	<b>314C960G11</b>
	1.13 (28.7)–12	10.91 (277.1)	<b>314C960G12</b>
<b>NBM, HNB, NBMH Breakers</b>			
800	1.13 (28.7)–12	5.50 (139.7)	<b>623B222G01</b>
	1.13 (28.7)–12	8.00 (203.2)	<b>623B222G02</b>
	1.13 (28.7)–12	10.50 (266.7)	<b>623B222G03</b>
1200	1.25 (31.8)–12	5.50 (139.7)	<b>373B375G04</b>
	1.25 (31.8)–12	10.50 (266.7)	<b>373B375G03</b>

#### Line and Load Terminal Shields <sup>⑤</sup>

Breaker Type	Description	Style Numbers
KAM	Line terminals	<b>1261C93G01</b>
	Load terminals	<b>1262C46G01</b>
LAM-400	Line terminals	<b>1261C95G01</b>
	Load terminals	<b>1262C48G01</b>
MAM	Line terminals	<b>1261C97G01</b>
	Load terminals	<b>1261C97G02</b>

#### Notes

- ① Not UL listed.
- ② 400 ampere LA studs of the same length have sufficient clearance; however, customer connections may make it necessary to use a short stud adjacent to a long stud.
- ③ 150, 300 and 400 ampere frames only.
- ④ This is a special stud that includes six contact nuts for use where bus contact nuts must be used.
- ⑤ For breakers used with terminals and cable connections. Sold in packages of 10.

#### Standard Handle Reset Undervoltage Release

For Classic breakers field mountable on special frames listed on **Page V4-T2-399**, or replacement on breakers originally equipped with this type UVR.

For undervoltage protection. A solenoid device mounts within breaker case. Coil must be energized before closing breaker. Trips breaker

when voltage drops below 35 to 70% of coil rating. Picks up and seals in at 72 to 85% of coil rating. For line voltages up to 250 Vdc or 600 Vac. Externally mounted resistors are supplied for certain ratings. Standard leads extend 18.00 inches (457.2 mm) outside of breaker. Longer leads may be specified.

Breaker Type	Volts	Style Numbers
<b>Right-Hand Mounting</b>		
LAM, HLAM	120 Vac	<b>4995D12G11</b>
	120 Vac <sup>①</sup>	<b>1228C76G03</b>
	240 Vac	<b>4995D12G13</b>
	480 Vac	<b>4995D12G14</b>
	125 Vdc	<b>4995D12G09</b>
MAM, HMAM, MAMH	120 Vac	<b>5672D69G11</b>
	120 Vac <sup>①</sup>	—
	240 Vac	<b>5672D69G13</b>
NBM, HNBM, NBMH	480 Vac	<b>5672D69G14</b>
	120 Vac	<b>4995D11G11</b>
	120 Vac <sup>①</sup>	<b>1229C35G03</b>
	240 Vac	<b>4995D11G13</b>
	480 Vac	<b>4995D11G14</b>
	<b>Left-Hand Mounting</b>	
KAM, HKAM	120 Vac	<b>4995D10G01</b>
	120 Vac <sup>①</sup>	<b>1228C76G03</b>
	240 Vac	<b>4995D10G03</b>
	480 Vac	<b>4995D10G04</b>

#### Shunt Trips

For tripping breaker from a remote point. A solenoid device mounts within breaker case. Breaker trips when coil is energized. A cutoff switch breaks the circuit to the momentary rated coil when breaker opens. Available for

control voltages up to 250 Vdc or 600 Vac. Voltage and frequency must be specified. Standard leads extend 18.00 inches (457.2 mm) outside of breaker. Longer leads may be specified.

Breaker Type	Volts (50–60 Hz)	Style Numbers
<b>Right-Hand Mounting</b>		
KAM, HKAM	480 Vac	<b>2605D15G16</b>
	240 Vac	<b>2605D15G17</b>
	120 Vac	<b>2605D15G19</b>
LAM, HLAM	480 Vac	<b>2606D56G16</b>
	240 Vac	<b>2606D56G17</b>
	120 Vac	<b>2606D56G19</b>
	48 Vdc	<b>2606D56G07</b>
MAM, HMAM, MAMH	480 Vac	<b>2606D57G16</b>
	240 Vac	<b>2606D57G17</b>
	120 Vac	<b>2606D57G19</b>
NBM, HNBM, NBMH	480 Vac	<b>2606D58G16</b>
	240 Vac	<b>2606D58G17</b>
	120 Vac	<b>2606D58G19</b>
<b>Left-Hand Mounting</b>		
KAM, HKAM	480 Vac	<b>2605D15G02</b>
	240 Vac	<b>2605D15G03</b>
	120 Vac	<b>2605D15G05</b>
LAM, HLAM	480 Vac	<b>2606D56G02</b>
	240 Vac	<b>2606D56G03</b>
	120 Vac	<b>2606D56G05</b>
MAM, HMAM, MAMH	480 Vac	<b>2606D57G02</b>
	240 Vac	<b>2606D57G03</b>
	120 Vac	<b>2606D57G05</b>
NBM, HNBM, NBMH	480 Vac	<b>2606D58G02</b>
	240 Vac	<b>2606D58G03</b>
	120 Vac	<b>2606D58G05</b>

#### Notes

- ① Electrical reset UVR.
- ② Auto reset type.

## Reference Information

E<sup>2</sup> Cross-Reference

Series C Mining	Superseded by E <sup>2</sup> Mining
1491D72G31	E2J3070T
1491D72G32	E2J3090T
1491D72G33	E2J3100T
1491D72G37	E2J3200T
6622C87G27	E2K3225AWU66
6622C87G28	E2K3225DWU66
6622C87G32	E2K3400GWU66
E2KM3100	E2KEM3100W
E2KM3100U66	E2KEM3100WU66
E2KM3125	E2KEM3125W
E2KM3125U66	E2KEM3125WU66
E2KM3150	E2KEM3150W
E2KM3150MU66	E2KEM3150WU66
E2KM3150TM	E2KEM3150MW
E2KM3150U66	E2KEM3150MWU66
E2KM3200	E2KEM3200W
E2KM3200U66	E2KEM3200WU66
E2KM3225	E2KEM3225W
E2KM3225F	E2KM3400F
E2KM3225FUV	E2KM3400F
E2KM3225MU66	E2KEM3225MWU66
E2KM3225TM	E2KEM3225TM
E2KM3225U66	E2KEM3225WU66
E2LM3300U66	E2LEM3300WU66
E2LM3350U66	E2LEM3350WU66
E2LM3400U66	E2LEM3400WU66
E2LM3400F	E2LM3600F
E2LM3400FUV	E2LM3600F
E2LM3400M2U66	E2LEM3400M2WU66
E2LM3400MU66	E2LEM3400MWU66
E2LM3400U66	E2LEM3400WU66
FDBM3015	E2F3015
FDBM3015WU62	E2F3015WU62
FDBM3020	E2F3020
FDBM3025	E2F3025
FDBM3025U62	E2F3025U62
FDBM3030	E2F3030
FDBM3030U62	E2F3030WU62
FDBM3030WU62	E2F3030WU62
FDBM3035	E2F3035

Series C Mining	Superseded by E <sup>2</sup> Mining
FDBM3040	E2F3040
FDBM3045	E2F3045
FDBM3050	E2F3050
FDBM3050U62	E2F3050U62
FDBM3050WU62	E2F3050WU62
FDBM3060	E2F3060
FDBM3070	E2F3070
FDBM3070WU62	E2F3070WU62
FDBM3080	E2F3080
FDBM3090	E2F3090
FDBM3100	E2F3100
FDBM3100LM04U62	E2F3100M04U62
FDBM3125	E2F3125
FDBM3150	E2F3150
FDBM3150L	E2F3150L
FDM3015	E2F3015
FDM3015L	E2F3015L
FDM3015LU62	E2F3015LU62
FDM3020	E2F3020
FDM3020LU62	E2F3020LU62
FDM3025	E2F3025
FDM3025L	E2F3025L
FDM3025LS22	E2F3025LS22
FDM3025LU62	E2F3025LU62
FDM3030	E2F3030
FDM3030LS22	E2F3030LS22
FDM3040	E2F3040
FDM3040L	E2F3040L
FDM3040LU62	E2F3040LU62
FDM3050	E2F3050
FDM3050LU62	E2F3050LU62
FDM3050U62	E2F3050U62
FDM3060	E2F3060
FDM3060LU62	E2F3060LU62
FDM3070	E2F3070
FDM3070A02U62	E2F3070A02U62
FDM3080	E2F3080
FDM3090	E2F3090
FDM3100	E2F3100
FDM3100LS22	E2F3100LS22

# 2.6

## Molded Case Circuit Breakers

### Specialty Breakers

#### E<sup>2</sup> Cross-Reference, continued

2

Series C Mining	Superseded by E <sup>2</sup> Mining
FDM3100LU62	E2FLU62
FDM3125	E2F3125
FDM3125LU62	E2F3125LU62
FDM3150	E2F3150
HFDM003AM	E2F003AM
HFDM003AMLU62	E2F003AMLU62
HFDM007CM	E2F007CM
HFDM007CMU62	E2F007CMU62
HFDM015EM	E2F015EM
HFDM015EMA02	E2F015EMA02
HFDM015EMLU62	E2F015EMLU62
HFDM015EMU62	E2F015EMU62
HFDM030HM	E2F030HM
HFDM030HMLU62	E2F030HMLU62
HFDM030HMU62	E2F030HMU62
HFDM050KM	E2F050KM
HFDM050KML	E2F050KML
HFDM050KMLU62	E2F050KMLU62
HFDM050KMU62	E2F050KMU62
HFDM070MM	E2F070MM
HFDM070MMU62	E2F070MMU62
HFDM1001M	E2F1001M
HFDM1001MS22	E2F1001MS22
HFDM100LM	E2F100LM
HFDM100LMA02	E2F100LMA02
HFDM100LMU62	E2F100LMU62
HFDM 100RM	E2F100RM
HFDM100RML	E2F100RML
HFDM100RMS22	E2F100RMS22
HFDM100RMU62	E2F100RMU62
HFDM150TM	E2F150TM
HFDM150TML	E2F150TML
HFDM150TMU62	E2F150TMU62
HFDM150UM	E2F150UM
JCDA2D1S30	E2JM250MDA2D1S30
JCMA2D1S30	E2JM250MFA2D1S30
JDCM3070W	E2JM3070W
JDCM3090W	E2JM3090W
JDCM3100W	E2JM3100W
JDCM3125W	E2JM3125W

Series C Mining	Superseded by E <sup>2</sup> Mining
JDCM3150W	E2JM3150W
JDCM3175W	E2JM3175W
JDCM3200W	E2JM3200W
JDCM3225A5W	E2JM3225AW
JDCM3225D5W	E2JM3225DW
JDCM3225W	E2JM3225W
JDCM3250A5MW	E2JM3250MAW
JDCM3250A5MWU18	E2JM3250MAWU18
JDCM3250A5W	E2JM3250AW
JDCM3250C5MW	E2JM3250MCW
JDCM3250D5MW	E2JM3250MDW
JDCM3250D5MWA06	E2JM3250MDWA06
JDCM3250D5W	E2JM3250DW
JDCM3250D5WS10	E2JM3250DWS10
JDCM3250F	E2JM3250F
JDCM3250F5MD01	E2JM3250MFD01
JDCM3250F5MW	E2JM3250MFW
JDCM3250G5MW	E2JM3250MGW
JDCM3250G5WA02D01	E2JM3250MGA02D01
JDCM3250J5MW	E2JM3250MJW
JDCM3250J5MWA02	E2JM3250MJA02
JDCM3250J5WA02D01	E2JM3250MJA02D01
JDCM3250J5WD01	E2JM3250MJD01
JDCM3250K5MW	E2JM3250MKW
JDCM3250L5MW	E2JM3250MLW
JDCM3250MW	E2JM3250MW
JDCM3250W	E2JM3250W
JDCMAA2D1	E2JM3250MMA02D01
JDCMDD1S30	E2JM3250MDS30D01
JDCMFD01	E2JM3250MFD01
JDCMGA02D1	E2JM3250MGA02D01
JDCMJA2D1	E2JM3250MJA02D01
JDCMJD01	E2JM3250MJD01
JDM2250F	E2JM3250F
JDM3070W	E2J3070W
JDM3090W	E2J3090W
JDM3100W	E2J3100W
JDM3125W	E2J3125W
JDM3150W	E2J3150W
JDM3150WU18	E2J3150WU18

E<sup>2</sup> Cross-Reference, continued

Series C Mining	Superseded by E <sup>2</sup> Mining
JDM3175W	E2J3175W
JDM3200W	E2J3200W
JDM3200WA06	E2J3200WA06
JDM3225A5W	E2J3225AW
JDM3225D5W	E2J3225DW
JDM3225W	E2J3225W
JDM3250A5MW	E2J3250MAW
JDM3250A5W	E2J3250AW
JDM3250C5MW	E2J3250CW
JDM3250D5MW	E2J3250MDW
JDM3250D5W	E2J3250DW
JDM3250F	E2J3250F
JDM3250F5MW	E2J3250MFW
JDM3250G5MW	E2J3250MGW
JDM3250J5MW	E2J3250MJW
JDM3250K5MW	E2J3250MKW
JDM3250L5MW	E2J3250MLW
JDM3250MW	E2J3250MW
JDM3250W	E2J3250W
JDM3250WS10	E2J3250WS10
JM2225T1125-2250	E2J3225T
JM3070T	E2J3070T
JM3090T	E2J3090T
JM3100T	E2J3100T
JM3125T	E2J3125T
JM3150T	E2J3150T
JM3175T	E2J3175T
JM3200T	E2J3200T
JM3225T	E2J3225T
JM3225TA5	E2J3225TA
JM3225TD5	E2J3225TD
JM3250T	E2J3250T
JM3250TA5	E2J3250TA
JM3250TA5M_350-700	E2J3250TMA
JM3250TC5M	E2J3250TMC
JM3250TD5_500-1000	E2J3250TMD
JM3250TF5M_625-1250	E2J3250TMF
JM3250TG5M_750-1500	E2J3250TMG
JM3250TJ5M_875-1750	E2J3250TMJ
JM3250TK5M_1000-2000	E2J3250TMK

Series C Mining	Superseded by E <sup>2</sup> Mining
JM3250TL5M_1125-2250	E2J3250TML
JM3250TM	E2J3250TM
KDCM3100W	E2KM3100W
KDCM3125W	E2KM3125W
KDCM3150W	E2KM3150W
KDCM3175W	E2KM3175W
KDCM3200W	E2KM3200W
KDCM3225A5MW	E2KM3200MAW
KDCM3225D5MW	E2KM3200MDW
KDCM3225W	E2KM3225W
KDCM3250W	E2KM3250W
KDCM3250WU18	E2KM3250WU18
KDCM3300W	E2KM3300W
KDCM3350W	E2KM3350W
KDCM3400D5MA02D09H04	E2KM3400MDA02D09H04
KDCM3400D5MW	E2KM3400MDW
KDCM3400D5MWA02D07	E2KM3400MDA02D07
KDCM3400D5W	E2KM3400DW
KDCM3400D5WD09	E2KM3400DD09
KDCM3400F	E2KM3400F
KDCM3400F5MW	E2KM3400MFW
KDCM3400FD09G04	E2KM3400MFD09G04
KDCM3400G5MW	E2KM3400MGD09G05
KDCM3400G5MWD09H04	E2KM3400MGD09H04
KDCM3400G5W	E2KM3400MGW
KDCM3400G5WD07	E2KM3400MGD07
KDCM3400J5MA02D09	E2KM3400MJA02D09
KDCM3400J5MA2D9G4S30	E2KM3400MJA2D9G4S30
KDCM3400J5MD09	E2KM3400MJD09
KDCM3400J5MD09H04S30	E2KM3400MJD09H04S30
KDCM3400J5MW	E2KM3400MJW
KDCM3400J5MWA02D07	E2KM3400MJA02D07
KDCM3400J5MWA06	E2KM3400MJWA06
KDCM3400J5MWD07S30	E2KM3400MJD07S30
KDCM3400J5WD07	E2KM3400MJD07
KDCM3400K5MW	E2KM3400MKW
KDCM3400K5MWS10	E2KM3400MKWS10
KDCM3400K5MWU18	E2KM3400MKWU18
KDCM3400L5MW	E2KM3400MLW
KDCM3400L5MWD09H04	E2KM3400MLD09H04



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## Molded Case Circuit Breakers

### Specialty Breakers

#### E<sup>2</sup> Cross-Reference, continued

2

Series C Mining	Superseded by E <sup>2</sup> Mining
KDCM3400L5MWS10	E2KM3400MLWS10
KDCM3400L5WD07	E2KM3400MLD07
KDCM3400MW	E2KM3400MW
KDCM3400N5MW	E2KM3400MNW
KDCM3400N5MWA06	E2KM3400MNWA06
KDCM3400N5WA02D07	E2KM3400MNA02D07
KDCM3400R5MW	E2KM3400MRW
KDCM3400W	E2KM3400W
KDCM3400W5MW	E2KM3400MWW
KDCMDMD07	E2KM3400MDD07
KDCMNA2D7	E2KM3400MNA02D07
KDM2400F	E2K2400F
KDM2400G5MS50	E2K2400MGWS50
KDM2400G5MW	E2K2400MGW
KDM2400W5MW	E2K2400MWW
KDM2400W5MWA06D07S10	E2K2400MWA06D07S10
KDM2400W5MWA06D10S10	E2K2400MWA06D10S10
KDM2400W5MWD07	E2K2400MWD07
KDM2400W5MWD07S10	E2K2400MWD07S10
KDM2400W5MWD10	E2K2400MWD10
KDM2400W5MWD10S10	E2K2400MWD10S10
KDM2400W5MWS10	E2K2400MWS10
KDM3100W	E2K3100W
KDM3125W	E2K3125W
KDM3150W	E2K3150W
KDM3150WA06	E2K3150WA06
KDM3175W	E2K3175W
KDM3200W	E2K3200W
KDM3225A5W	E2K3225AW
KDM3225D5A13D09U18	E2K3225DA13D09U18
KDM3225D5MW	E2K3400MDW
KDM3225D5W	E2K3225DW
KDM3225F	E2K3400F
KDM3225W	E2K3225W
KDM3225WK37	E2KE3225W
KDM3225WK37U18	E2KE3225WU18
KDM3225WK38	E2KE3225MW
KDM3250W	E2K3250W
KDM3300W	E2K3300W
KDM3300WA06U18	E2K3300WA06U18

Series C Mining	Superseded by E <sup>2</sup> Mining
KDM3300WS10	E2K3300WS10
KDM3350W	E2K3350W
KDM3400D5MW	E2K3400MDW
KDM3400D5W	E2K3400DW
KDM3400D5WU18	E2K3400DWU18
KDM3400F	E2K3400F
KDM3400F5MW	E2K3400MFW
KDM3400FK37A06D09D18	E2KE3400A06D09D18
KDM3400G5A06D09U18	E2K3400GA06D09U18
KDM3400G5A13D09U18	E2K3400GA13D09U18
KDM3400G5MW	E2K3400MGW
KDM3400G5W	E2K3400GW
KDM3400G5WA06	E2K3400GWS10
KDM3400G5WS10	E2K3400GWS10
KDM3400G5WU18	E2K3400GWU18
KDM3400J5MW	E2K3400MJW
KDM3400K5MS54	E2K3400MKWS54
KDM3400K5MW	E2K3400MKW
KDM3400L5MW	E2K3400MLW
KDM3400MW	E2K3400MW
KDM3400MWA06U18	E2K3400MWA06U18
KDM3400N5MW	E2K3400MNW
KDM3400R5MW	E2K3400MRW
KDM3400W	E2K3400W
KDM3400W5MW	E2K3400MWW
KEM3100T	KEM3100T
KEM3125T	KEM3125T
KEM3150T	KEM3150T
KEM3150TM	KEM3150TM
KEM3200T	KEM3200T
KEM3225T	KEM3225T
KEM3225T2	KEM3225T2
KEM3225TM	KEM3225TM
KEM3225TM2	KEM3225TM2
KM2225TA5	E2K2225TA
KM2225TA5M	E2K2400TMA
KM2225TD5	E2K2225TD
KM2225TD5M	E2K2400TMD
KM2400TD5	E2K2400TD
KM2400TD5M	E2K2400TMD

E<sup>2</sup> Cross-Reference, continued

Series C Mining	Superseded by E <sup>2</sup> Mining
KM2400TG5M	E2K2400TMG
KM2400TN5M	E2K2400TMN
KM2400TW5M	E2K2400TMW
KM3100T	E2K3100T
KM3125T	E2K3125T
KM3150T	E2K3150T
KM3175T	E2K3175T
KM3200T	E2K3200T
KM3225T	E2K3225T
KM3225TA5	E2K3225TA
KM3225TA5M	E2K3400TMA
KM3225TD5	E2K3225TD
KM3225TD5M	E2K3400TMD
KM3250T	E2K3250T
KM3300T	E2K3300T
KM3350T	E2K3350T
KM3400T	E2K3400T
KM3400TD5	E2K3400TD
KM3400TF5M	E2K3400TMF
KM3400TG5M	E2K3400TMG
KM3400TJ5M	E2K3400TMJ
KM3400TK5M	E2K3400TMK
KM3400TL5M	E2K3400TML
KM3400TM	E2K3400TM
KM3400TN5M	E2K3400TMN
KM3400TR5M	E2K3400TMR
KM3400TW5M	E2K3400TMW
LDCM3600EMA05W	E2LEM3600MA05W
LDCM3600F	E2LM3600F
LDM3600F	E2L3600F

Series C Mining	Superseded by E <sup>2</sup> Mining
LEM3300T	LEM3300T
LEM3350T	LEM3350T
LEM3400T	LEM3400T
LEM3400T2	LEM3400T2
LEM3400TM	LEM3400TM
LEM3400TM2	LEM3400TM2
LEM3600T	LEM3600T
LEM3600TM	LEM3600TM
LM3600TL6M	E2L3600TML
LM3600TN6M	E2L3600TMN
LM3600TP6M	E2L3600TMP
LM3600TR6M	E2L3600TMR
LM3600TS6M	E2L3600TM
LM3600TX6M	E2L3600TMX
UVE3LP08K	UVE3LP08K
UVE4LP08K	UVE4LP08K

2

## Additional Information on Mining Breakers

Source	Description
TD01217001E	E <sup>2</sup> Mining Circuit Breaker Dimensional Data
BR01217001E	E <sup>2</sup> Mining Circuit Breaker Brochure
TC01217001E	E <sup>2</sup> Mining Circuit Breaker Time Current Curves
<a href="http://www.eaton.com/mining">www.eaton.com/mining</a>	Mining and Metals

**GFR Relay**



### Add-On Ground Fault Protection—Type GFR

**Product Description**

A Type GFR ground fault protection system, when properly installed on a grounded electrical system, will sense phase-to-ground fault currents. When the level of fault current is in excess of the pre-selected current pickup and time delay settings, the GFR relay will initiate a trip action of a disconnect device, which will open the faulted circuit and clear the fault.

The GFR devices are UL Class I devices designed to protect electrical equipment against extensive damage from arcing ground faults.

A basic Type GFR ground fault protection system consists of a ground fault relay, a ground fault current sensor and a disconnect device equipped with a shunt trip device. This disconnect device can be a molded case circuit breaker, a power circuit breaker, a bolted pressure switch or other fusible disconnect device, suitable for application with UL Class I ground fault sensing and relaying equipment.

**Note:** Suitable for either surface or semi-flush mounting.

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Direct Current Circuit Breakers . . . . .	<b>V4-T2-342</b>
PVGard Solar Circuit Breakers—600 Vdc Per-Pole and 1000 Vdc Poles-in-Series . . . . .	<b>V4-T2-355</b>
E <sup>2</sup> Mining Service Circuit Breakers . . . . .	<b>V4-T2-367</b>
Classic Mining Breakers . . . . .	<b>V4-T2-390</b>
Add-On Ground Fault Protection—Type GFR	
Product Selection . . . . .	<b>V4-T2-405</b>
Accessories . . . . .	<b>V4-T2-406</b>
Technical Data and Specifications . . . . .	<b>V4-T2-406</b>

**Standards and Certifications**

Eaton’s GFR ground fault relays, current sensors, test panels and accessory devices are UL listed by Underwriters Laboratories in accordance with their standard for ground fault sensing and relaying equipment, UL 1053, under File E48381.

**Note:** Relays are also listed with CSA under their file number 43357.



**Product Selection**

Each installation requires:

- One relay unit (select trip ampere as required)
- One current sensor (select configuration required)
- One circuit breaker or disconnect device with shunt trip, or a shunt trip attachment for mounting in existing breaker
- Test panel (optional)

**GFR Relay**



**GFR Relay**

**GFR Relay Types**

**Ground Fault Pickup Amperes**

1-12 Catalog Number ①	5-60 Catalog Number ①	100-1200 Catalog Number ①
-----------------------------	-----------------------------	---------------------------------

**For 120 Volt 50/60 Hz Control**

Electrical reset with zone interlocking	<b>GFR12EI</b>	<b>GFR60EI</b>	<b>GFR1200EI</b>
Electrical reset without zone interlocking	<b>GFR12E</b>	<b>GFR60E</b>	<b>GFR1200E</b>
Mechanical reset with zone interlocking	<b>GFR12MI</b>	<b>GFR60MI</b>	<b>GFR1200MI</b>
Mechanical reset without zone interlocking	<b>GFR12M</b>	<b>GFR60M</b>	<b>GFR1200M</b>

**For 120 Vdc Control**

Electrical reset with zone interlocking	—	—	<b>GFR1200EID</b>
Electrical reset without zone interlocking	—	—	<b>GFR1200ED</b>
Mechanical reset with zone interlocking	—	—	<b>GFR1200MID</b>
Mechanical reset without zone interlocking	—	—	<b>GFR1200MD</b>

**Typical Current Sensor**



**Current Sensor**

Window Size in Inches (mm)	Catalog Number
-------------------------------	-------------------

**Used with Relays Rated 1-12 Amperes**

5.50 (139.7) I.D.	<b>1283C45G01</b>
-------------------	-------------------

**Used with Relays Rated 5-60 Amperes**

2.50 (63.5) I.D.	<b>179C768G01</b>
5.50 (139.7) I.D.	<b>1256C13G01</b>
7.81 x 11.00 (198.4 x 279.4) Rect. ②	<b>1257C88G04</b>
3.31 x 24.94 (84.1 x 760.5) Rect. ②	<b>1257C92G03</b>

**Used with Relays Rated 100-1200 Amperes**

2.50 (63.5) I.D.	<b>179C768G02</b>
5.50 (139.7) I.D.	<b>1256C13G02</b>
8.25 (209.6) I.D.	<b>179C767G02</b>
7.81 x 11.00 (198.4 x 279.4) Rect. ②	<b>1257C88G03</b>
9.94 x 16.94 (252.5 x 430.3) Rect. ②	<b>1257C90G02</b>
9.94 x 23.94 (252.5 x 608.1) Rect. ②	<b>1257C91G02</b>
15.94 x 19.94 (404.9 x 506.4) Rect. ②	<b>1257C89G02</b>
3.31 x 24.94 (84.1 x 633.5) Rect. ②	<b>1257C92G04</b>
6.75 x 29.64 (171.5 x 752.9) Rect. ②	<b>1255C39G03</b>

**Notes**

- ① Suitable for either surface or semi-flush mounting.
- ② One end removable for installation.

#### Accessories

##### Options

Additional optional equipment can be added to the protection system to meet the requirements of the specifying engineer, including:

- Ground fault test panel
- Ground fault warning indicator relay
- Ground fault indicating ammeter

GFR relays are available with zone selective interlocking circuitry to interlock several relays within the same system. This allows the relay which detects a ground fault to instantly clear the fault by tripping the disconnect device. The relay simultaneously sends a signal to relay units “upstream” from the fault to time delay or to block their operation completely. Current sensors in various designs provide a range of “window” sizes to accommodate standard bus and cable arrangements.

Shunt trip attachments may be ordered for field mounting in Eaton’s molded case circuit breakers, or may be ordered factory installed in the breaker.

##### Test Panel (120 Vac)

Used to test the ground fault system, to give an indication the relay has tripped the breaker, and to reset the relay after tripping. These functions may be separately mounted pilot devices.

**Note:** When a mechanically reset relay is used with a test panel, both the relay and test panel must be reset following either a simulated ground fault test or actual ground fault. Not UL listed.

##### Optional Test Panel

Control	Test	Catalog Number
120 Volt 50/60 Hz	120 Volt 50/60 Hz	GFRTF

##### Ground Fault Warning Indicator

This is an accessory item for use with GFR relays with interlocking circuitry. At approximately 30–50% of the relay pickup setting, the indicator switches separate 120 Vac control power to a lamp or relay, (not included) to give an indication of a ground fault. The indicator is rated 110/120 Vac 50/60 Hz for a maximum indicator load of 0.5 amperes.

##### Ground Fault Warning Indicator

Description	Catalog Number
Manual reset	1234C67G01
Self-resetting	1234C67G02

##### Indicating Ammeter

The optional indicating ammeter connects to the sensor terminals through a momentary contact pushbutton, and will indicate (in amperes) any ground fault current flowing through the sensor. Kit includes the ammeter and pushbutton.

**Note:** Not UL listed.

##### Ammeter Kit

GFR System Used with	Kit Catalog Number
1–12 ampere	752B820G01
5–60 ampere	752B820G02
100–1200 ampere	752B820G03

##### Shunt Trip Attachments

Use 120 Vac shunt trips.

##### Faceplate

Recommended when these relays are semi-flush mounted, to close the door cutout opening.

##### Face Plate

Description	Catalog Number
Faceplate	752B410G01

#### Technical Data and Specifications

##### Sensor

- 600 volt, 50/60 Hz maximum system voltage

##### Electrical Ratings

###### GFR Relay

- Ground fault detection ranges:
  - 1 to 12, 5 to 60 or 100 to 1200 amperes
- Output contacts:
  - 240 volt, 50/60 Hz: 3.0 amperes
  - 120 volt, 50/60 Hz: 6.0 amperes
  - 28 Vdc: 3.0 amperes
  - 125 Vdc: 0.5 amperes
- Control power requirements:
  - 120 volt, 50/60 Hz or 125 Vdc (optional)

Handle Mechanisms



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Direct (Close-Coupled) Handle Mechanisms . . .	<b>V4-T2-415</b>
Flex Shaft . . . . .	<b>V4-T2-416</b>
Handle Mechanisms—Series C	
High-Performance Rotary Handle Mechanisms . .	<b>V4-T2-421</b>
Series C Rotary . . . . .	<b>V4-T2-425</b>
Universal Rotary . . . . .	<b>V4-T2-427</b>
Direct (Close-Coupled) Handle Mechanisms . . .	<b>V4-T2-429</b>
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Handle Mechanisms—Series G

Product Overview

Handle mechanisms are used to operate molded case circuit breakers, molded case switches and motor circuit protectors. They are available in three basic configurations—Flange Mounted, Through-the-Door and Direct (Close-Coupled)—providing safe, dependable operation and ease of installation.

**Through-the-Door**

- High-Performance Rotary
- Universal Rotary

**Direct (Close-Coupled)**

- Universal Direct

**Flange Mounted**

- Flex Shaft™

Handle mechanisms are used on enclosed circuit breakers, control panels and motor control centers in many different applications. Eaton has a handle mechanism for virtually any need.

#### Handle Mechanisms

2



### High-Performance Rotary Handle Mechanisms

#### Product Description

The high-performance rotary handle mechanism uses a simple, yet robust design to make installation and operation easy. The external handle's key functional components are all metallic, ensuring reliability. The metal-on-metal interface between the handle and shaft prevents contaminant buildup that could impede operation, while UV and chemical agent resistant materials protect the handle from heat and fading in direct sunlight, as well as chemicals that may be introduced in harsh environments.

In addition to its robust design features, the handle mechanism has stand-off support that allows for easy operation with a gloved hand. With a shallow profile, the handle can easily be used in applications where an internal or double door is required.

The high-performance external handle can accept padlocks or multi-hasp locks. The door is interlocked when padlocked and cannot be bypassed.

#### Description

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Universal Rotary . . . . .	<b>V4-T2-427</b>
Direct (Close-Coupled) Handle Mechanisms . . . . .	<b>V4-T2-429</b>
Flex Shaft . . . . .	<b>V4-T2-431</b>
Handle Extension . . . . .	<b>V4-T2-434</b>

#### Features

- NEMA Type 1/3R/12 (IP54) and NEMA Type 4/4X (IP65) ratings
- Black/Blue or Red/Yellow external handle colors
- Three shaft lengths—6, 12 and 24 inches, which can be cut to size to match enclosure depth
- Conveniently packaged as kit containing handle, shaft and mechanism
- Replacement parts are available separately
- Metallic functional components ensure reliability
- Metal-on-metal interface between handle and shaft
- UV and chemical agent-resistant materials protect the handle
- Shallow profile
- Compatible with both Series C and Series G molded case circuit breakers and molded case switch platforms
- Same handle can be used on multiple frame sizes, reducing the number of parts needed
- Red and yellow handles to designate emergency disconnecting means
- All handle mechanisms can accept padlocks or multi-hasps locks for added flexibility
- Fast, easy installation (see video on website for step-by-step instructions)

#### Standards and Certifications

The mechanisms for EG, JG and LG breakers have an internal handle that can be operated independent of door position, and locked-out to meet one of the key NFPA requirements (NFPA® 79) and UL 508A disconnect requirements.

- NEMA 1/3R/12, IP54
- NEMA 4/4X, IP65







## Product Selection

## Handle Mechanisms for Series G Frames

2

## Kits Only (Kit Includes Shaft, Mechanism and Handle)—EG-, JG- and LG-Frame

	Description	Rating Type		EG-Frame Catalog Number	JG-Frame Catalog Number	LG-Frame Catalog Number
		NEMA	IP			
<b>S01 Blue Handle</b> 	S01 blue handle, 6-inch shaft	1/3R/12	54	EGHMVD06B0 / 68C6040G25	JGHMVD06B0 / 68C6041G13	—
		4/4X	65	EGHMVD06BX0 / 68C6040G28	JGHMVD06BX0 / 68C6041G16	—
	S01 blue handle, 12-inch shaft	1/3R/12	54	EGHMVD12B0 / 68C6040G26	JGHMVD12B0 / 68C6041G14	—
		4/4X	65	EGHMVD12BX0 / 68C6040G29	JGHMVD12BX0 / 68C6041G17	—
	S01 blue handle, 24-inch shaft <sup>①</sup>	1/3R/12	54	EGHMVD24B0 / 68C6040G27	JGHMVD24B0 / 68C6041G15	—
		4/4X	65	EGHMVD24BX0 / 68C6040G30	JGHMVD24BX0 / 68C6041G18	—
<b>S01 Red Handle</b> 	S01 red handle, 6-inch shaft	1/3R/12	54	EGHMVD06R0 / 68C6040G31	JGHMVD06R0 / 68C6041G19	—
		4/4X	65	EGHMVD06RX0 / 68C6040G34	JGHMVD06RX0 / 68C6041G22	—
	S01 red handle, 12-inch shaft	1/3R/12	54	EGHMVD12R0 / 68C6040G32	JGHMVD12R0 / 68C6041G20	—
		4/4X	65	EGHMVD12RX0 / 68C6040G35	JGHMVD12RX0 / 68C6041G23	—
	S01 red handle, 24-inch shaft <sup>①</sup>	1/3R/12	54	EGHMVD24R0 / 68C6040G33	JGHMVD24R0 / 68C6041G21	—
		4/4X	65	EGHMVD24RX0 / 68C6040G36	JGHMVD24RX0 / 68C6041G24	—
<b>S2 Blue Handle</b> 	S2 blue handle, 6-inch shaft	1/3R/12	54	EGHMVD06B / 68C6040G13	JGHMVD06B / 68C6041G01	LGHMVD06B / 68C6042G01
		4/4X	65	EGHMVD06BX / 68C6040G16	JGHMVD06BX / 68C6041G04	LGHMVD06BX / 68C6042G04
	S2 blue handle, 12-inch shaft	1/3R/12	54	EGHMVD12B / 68C6040G14	JGHMVD12B / 68C6041G02	LGHMVD12B / 68C6042G02
		4/4X	65	EGHMVD12BX / 68C6040G17	JGHMVD12BX / 68C6041G05	LGHMVD12BX / 68C6042G05
	S2 blue handle, 24-inch shaft <sup>①</sup>	1/3R/12	54	EGHMVD24B / 68C6040G15	JGHMVD24B / 68C6041G03	LGHMVD24B / 68C6042G03
		4/4X	65	EGHMVD24BX / 68C6040G18	JGHMVD24BX / 68C6041G06	LGHMVD24BX / 68C6042G06
<b>S2 Red Handle</b> 	S2 red handle, 6-inch shaft	1/3R/12	54	EGHMVD06R / 68C6040G19	JGHMVD06R / 68C6041G07	LGHMVD06R / 68C6042G07
		4/4X	65	EGHMVD06RX / 68C6040G22	JGHMVD06RX / 68C6041G10	LGHMVD06RX / 68C6042G10
	S2 red handle, 12-inch shaft	1/3R/12	54	EGHMVD12R / 68C6040G20	JGHMVD12R / 68C6041G08	LGHMVD12R / 68C6042G08
		4/4X	65	EGHMVD12RX / 68C6040G23	JGHMVD12RX / 68C6041G11	LGHMVD12RX / 68C6042G11
	S2 red handle, 24-inch shaft <sup>①</sup>	1/3R/12	54	EGHMVD24R / 68C6040G21	JGHMVD24R / 68C6041G09	LGHMVD24R / 68C6042G09
		4/4X	65	EGHMVD24RX / 68C6040G24	JGHMVD24RX / 68C6041G12	LGHMVD24RX / 68C6042G12

**Notes**

<sup>①</sup> 24-inch handle comes with support bracket.





Shaft guide (68C6048G49) is optional and can be used with any high-performance handle listed above for greater alignment tolerance.



**Handle Mechanisms for Series G Frames**

2

**Kits Only (Kit Includes Shaft, Mechanism and Handle)—NG- and RG-Frame**

Description	Rating Type		NG-Frame	RG-Frame
	NEMA	IP	Catalog Number	Catalog Number
<b>S3 Blue Handle</b>  S3 blue handle, 10-inch shaft	1/3R/12	54	<b>NGHMVD08B / 68C6043G01</b>	—
	4/4X	65	<b>NGHMVD08BX / 68C6043G03</b>	—
<b>S3 Red Handle</b>  S3 red handle, 10-inch shaft	1/3R/12	54	<b>NGHMVD08R / 68C6043G02</b>	—
	4/4X	65	<b>NGHMVD08RX / 68C6043G04</b>	—
<b>S4 Blue Handle</b>  S4 blue handle, 10-inch shaft	1/3R/12	54	<b>NGHMVD08BT / 68C6043G05</b>	<b>RGHMVD08B / 68C6044G01</b>
	4/4X	65	<b>NGHMVD08BTX / 68C6043G07</b>	<b>RGHMVD08BX / 68C6044G03</b>
<b>S4 Red Handle</b>  S4 red handle, 10-inch shaft	1/3R/12	54	<b>NGHMVD08RT / 68C6043G06</b>	<b>RGHMVD08R / 68C6044G02</b>
	4/4X	65	<b>NGHMVD08RTX / 68C6043G08</b>	<b>RGHMVD08RX / 68C6044G04</b>

**Note**

Shaft guide (68C6048G49) is optional and can be used with any high-performance handle listed above for greater alignment tolerance.

**Separate Components for Series G Frames****Series G Components—Shafts and Mechanisms**

Frame	Shaft Width	Shaft Length				Mechanism Only
		6-Inch	10-Inch	12-Inch	24-Inch <sup>①</sup>	
EG	8 mm	66A6010G95	—	66A6010G96	66A6010G97	1498D66G17
JG	8 mm	66A6010G95	—	66A6010G96	66A6010G98	69D6025G17
LG	8 mm	66A6010G95	—	66A6010G96	66A6010G99	69D6051G30
NG	12 mm	—	66A6013H01	—	—	69D9101G30
RG	12 mm	—	66A6013H01	—	—	69D9101G31

**Series G Components—Handles Only**

Frame	Rating Type		Handles Only							
	NEMA	IP	S01 Blue/Black	S01 Red/Yellow	S2 Blue/Black	S2 Red/Yellow	S3 Blue/Black	S3 Red/Yellow	S4 Blue/Black	S4 Red/Yellow
EG	1/3R/12	54	68C6048G41	68C6048G42	68C6048G01	68C6048G02	—	—	—	—
	4/4X	65	68C6048G43	68C6048G44	68C6048G03	68C6048G04	—	—	—	—
JG	1/3R/12	54	68C6048G41	68C6048G42	68C6048G01	68C6048G02	—	—	—	—
	4/4X	65	68C6048G43	68C6048G44	68C6048G03	68C6048G04	—	—	—	—
LG	1/3R/12	54	—	—	68C6048G01	68C6048G02	68C6048G05	68C6048G06	—	—
	4/4X	65	—	—	68C6048G03	68C6048G04	68C6048G07	68C6048G08	—	—
NG	1/3R/12	54	—	—	—	—	68C6048G05	68C6048G06	68C6048G09	68C6048G10
	4/4X	65	—	—	—	—	68C6048G07	68C6048G08	68C6048G11	68C6048G12
RG	1/3R/12	54	—	—	—	—	—	—	68C6048G09	68C6048G10
	4/4X	65	—	—	—	—	—	—	68C6048G11	68C6048G12

**Notes**

① 24-inch handle comes with support bracket.

Shaft guide (68C6048G49) is optional and can be used with any high-performance handle listed above for greater alignment tolerance.

# 2.7

## Molded Case Circuit Breakers

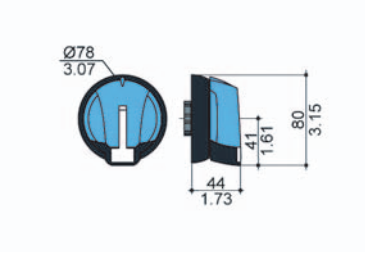
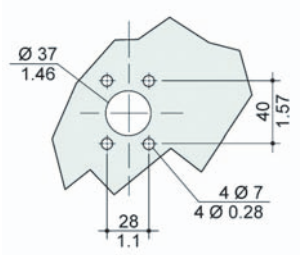
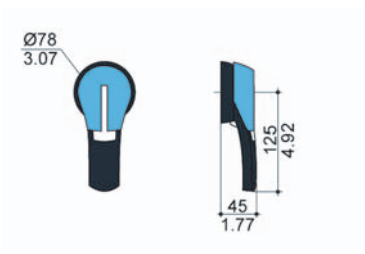
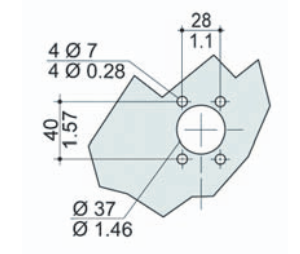
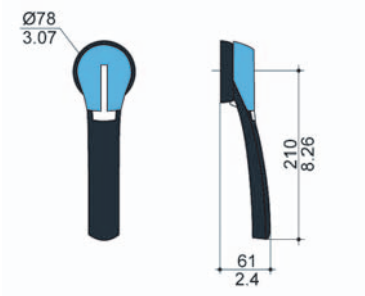
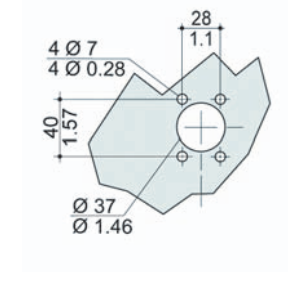
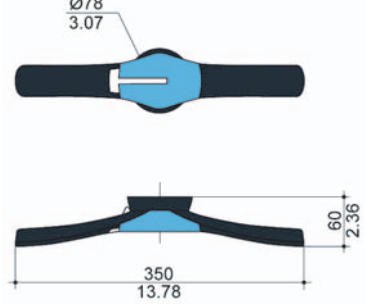
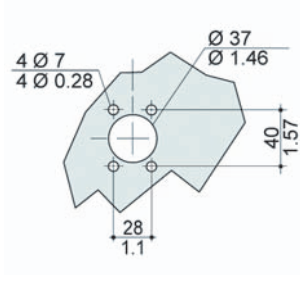
### Handle Mechanisms

#### Dimensions

Approximate Dimensions in mm (Inches)

2

#### High-Performance Rotary Handle Mechanisms

Handle Type	Front Operation Direction of Operation	Door Drilling
<b>Type S01</b>		
<b>Type S2</b>		
<b>Type S3</b>		
<b>Type S4</b>		

Handle Mechanisms



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Product Selection . . . . .	<b>V4-T2-414</b>
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Handle Mechanisms—Series C . . . . .	
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Series C Rotary . . . . .	<b>V4-T2-425</b>
Universal Rotary . . . . .	<b>V4-T2-427</b>
Direct (Close-Coupled) Handle Mechanisms . . . . .	<b>V4-T2-429</b>
Flex Shaft . . . . .	<b>V4-T2-431</b>
Handle Extension . . . . .	<b>V4-T2-434</b>

Universal Rotary

Product Description

Eaton’s Universal Rotary is suitable for use with Type 1 or 12 enclosure types. All rotary handle mechanisms include a handle “lock off” to prevent turning the breaker ON while in the OFF position, and indicate ON/OFF/Tripped/Reset positions. The Universal Rotary has the added feature of international markings for ON (I) and OFF (O). The Universal Rotary is made of molded material.

The Universal Rotary mechanisms for EG-, JG- and LG-Frame MCCBs can be operated by hand with the door open or “locked off” to prevent operation with the door open.

Standards and Certifications

Universal Rotary is UL listed and meets CSA requirements. Universal Rotary also meets IEC 60947-1 and IEC 60947-2 for international compliance. Rotary UL File Number is E64983.



Features

Features Comparison of Series C Rotary and Universal Rotary Handle Mechanism

Rotary	Number of Poles	NEMA Enclosure Type				Handle Lock-Off ②	Handle Indication: ON/OFF TRIPPED/RESET	International Markings ON (I) OFF (O)	Handle Material	Available Handle Colors	Handle Rotation	Shaft Lengths (Inches)
		1	3R	12	4/4X ①							
Series C rotary	—	■	■	■	■	■	■	■	Metal	Black	45 deg.	6, 12, 16, 24
Universal rotary	—	■	—	■	—	■	■	■	Molded plastic	Yellow/Red/Black	90 deg.	6, 12, 24

Notes

- ① Type 4/4X application requires special handle. See “Ordering Information.”
- ② All rotary handle mechanisms include a handle “Lock Off” to prevent turning the breaker ON while in the OFF position.

## Product Selection

2

## Universal Rotary



## Universal Rotary Through-the-Door Handle Mechanisms

Handle Color	UL Rating	Shaft Length in Inches (mm)	Complete Catalog Number <sup>①</sup>
<b>EG-Frame</b>			
Black	1, 12	6.00 (152.4)	<b>EHMVD06B</b>
		12.00 (304.8)	<b>EHMVD12B</b>
		24.00 (609.6)	<b>EHMVD24B</b>
Red	1, 12	6.00 (152.4)	<b>EHMVD06R</b>
		12.00 (304.8)	<b>EHMVD12R</b>
		24.00 (609.6)	<b>EHMVD24R</b>
<b>JG-Frame</b>			
Black	1, 12	6.00 (152.4)	<b>FJHMVD06B</b>
		12.00 (304.8)	<b>FJHMVD12B</b>
		24.00 (609.6)	<b>FJHMVD24B</b>
Red	1, 12	6.00 (152.4)	<b>FJHMVD06R</b>
		12.00 (304.8)	<b>FJHMVD12R</b>
		24.00 (609.6)	<b>FJHMVD24R</b>
<b>LG-Frame</b>			
Black	1, 12	6.00 (152.4)	<b>KLHMVD06B</b>
		12.00 (304.8)	<b>KLHMVD12B</b>
		24.00 (609.6)	<b>KLHMVD24B</b>
Red	1, 12	6.00 (152.4)	<b>KLHMVD06R</b>
		12.00 (304.8)	<b>KLHMVD12R</b>
		24.00 (609.6)	<b>KLHMVD24R</b>
<b>NG-Frame</b>			
Black	1	6.00 (152.4)	<b>HMVD5B</b>
<b>RG-Frame</b>			
Black	1	9.00 (228.6)	<b>HMVD6B</b>

**Note**

<sup>①</sup> Complete catalog number includes handle, mechanism, shaft and mounting hardware.

Handle Mechanisms



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**Direct (Close-Coupled) Handle Mechanisms**

**Product Description**

Direct (close-coupled) handle mechanisms mount directly to the circuit breaker. They are used in shallow enclosures where the standard variable depth Through-the-door type mechanism is not practical or cannot be used.

The Universal Direct handle mechanisms are rated Type 1 and Type 12.

The Universal Direct handle mechanism is available as standard with a door interlock to prevent opening the enclosure while the circuit breaker is in the ON position. It is also available without a door interlock.

**Application Description**

Direct (close-coupled) handle mechanisms are typically used for applications where high volume, standardized enclosures are being fabricated.

**Standards and Certifications**

The Universal Direct handle mechanism is UL listed, IEC 60947-1 and IEC 60947-2 compliant, and meets CSA requirements.



**Product Selection**

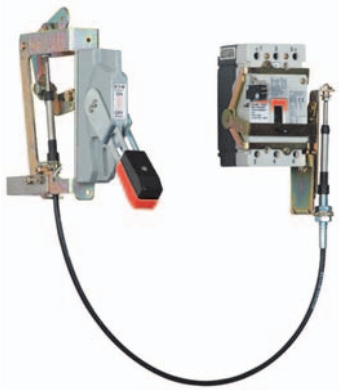
**Universal Direct (EG-LG)**



**Universal Direct Handle Mechanisms**

Frame	Black Handle Color		Red Handle Color	
	With Interlock Catalog Number	Without Interlock Catalog Number	With Interlock Catalog Number	Without Interlock Catalog Number
EG	EHMCCBI	EHMCCB	EHMCCRI	EHMCCR
JG	JHMCCBI	JHMCCB	JHMCCRI	JHMCCR
LG	LHMCCBI	LHMCCB	LHMCCRI	LHMCCR

**Handle Mechanisms**



### Flex Shaft

#### Product Description

##### **Flange-Mounted Handle Mechanisms**

Flange-mounted handle mechanisms mount on the flange of an enclosure door. The Flex Shaft is an extra heavy-duty mechanism that includes a flexible shaft in various lengths, 3 feet (0.9m) through 10 feet (3m) for use with various size enclosures.

The Flex Shaft handle will accept up to three padlock shackles, each with a maximum diameter of 3/8 inches (9.5 mm). It can be used with Type 12 fabricated enclosures. An optional handle is available for Flex Shaft that is suitable for use with Type 4 environments.

Flex Shaft comes preset from the factory, requiring only minor field adjustments on installation, which takes about 10 minutes—a significant time savings compared to installation of other types of flange handle mechanisms. The Flex Shaft mechanism also takes up less interior enclosure space than competitive designs, and the handle fits standard flange cutouts. Flex Shaft handle can be remotely mounted from breaker, where an operator can use it by “funneling” the cable through conduit.

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### Standards and Certifications

Flex Shaft is UL listed under File E64983 and meets CSA requirements.



**Product Selection**

**Note:** Type 4X handle mechanisms are available. Add Suffix X to the complete Catalog Number.

**Note:** When selecting the length of shaft, ensure minimum bending radius of 4 inches (101.6 mm) is maintained to operate properly.

**Note:** The standard method of shipment includes the mechanism preset at the factory; however, minor field adjustments may be required.

**Flex Shaft**



**Flex Shaft Flange-Mounted Handle Mechanisms** ①②

Breaker Frame	Flexible Shaft Length in Feet (m)				
	2 (0.6)	3 (0.9)	4 (1.2)	5 (1.3)	6 (1.8)
	Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
EG	EHMFS02	EHMFS03	EHMFS04	EHMFS05	EHMFS06
JG	N/A	JHMFS03	JHMFS04	JHMFS05	JHMFS06
LG	N/A	—	LHMFS04	—	—
NG	N/A	N/A	F5S04C	F5S05C	F5S06C
RG	N/A	N/A	F6S04	F6S05	F6S06

Breaker Frame	Flexible Shaft Length in Feet (m)			
	7 (2.1)	8 (2.4)	9 (2.7)	10 (3.1)
	Catalog Number	Catalog Number	Catalog Number	Catalog Number
EG	EHMFS07	EHMFS08	EHMFS09	EHMFS10
JG	JHMFS07	JHMFS08	JHMFS09	JHMFS10
LG	LHMFS07	—	—	LHMFS10
NG	N/A	N/A	N/A	F5S10C
RG	N/A	N/A	N/A	N/A

**Notes**

- ① Three-pole only for EG-; three- and four-pole for JG- and LG-Frame.
- ② EG-, JG- and LG-Frame can be left- or right-hand mounted.



## Accessories

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**Handle Auxiliary Switch—Early Break Design,  
1A–1B Contact for Flex Shaft**

Breaker Frame	Catalog Number
EG	AUX1EBFSEG
JG	AUX1EBFSJG
LG	AUX1EBFSLG

Auxiliary contact changes state prior to parting of breaker contacts to allow for shutdown of equipment. Contacts mounted on breaker mechanism customer supplied wiring.

**Type 12 Safety Door Hardware for Flex Shaft  
(E- through R-Frame) ①**

Catalog Number ②
C361KJ4
C361KJ6
C361KR

## Dimensions

**Type 12 Safety Door Hardware for Flex Shaft  
(E- through R-Frame) ①**

Catalog Number ②	Handle Length in Inches (mm)
C361KJ4	4.00 (101.6)
C361KJ6	6.00 (152.4)
C361KR	Roller latch ③

**Notes**

- ① Customer: Consult with box manufacturer for correct door hardware and any adapters required for assembly.
- ② The 1/4-inch x 1/2-inch (6.35 x 12.7 mm) standard mill rectangular locking bar is not supplied with these kits.
- ③ Third roller latch for use with 4.00- or 6.00-inch (101.6 or 152.4 mm) handle when three-point latching is required.

Handle Mechanisms



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Handle Mechanisms—Series C

Product Overview

Handle mechanisms are used to operate molded case circuit breakers, molded case switches and motor circuit protectors. They are available in three basic configurations—Flange Mounted, Through-the-Door and Direct (Close-Coupled)—providing safe, dependable operation and ease of installation.

**Through-the-Door**

- High-Performance Rotary
- Series C Rotary
- Universal Rotary

**Direct (Close-Coupled)**

- Universal Direct
- Euro IEC
- G Direct

**Flange Mounted**

- Flex Shaft
- C371

Handle mechanisms are used on enclosed circuit breakers, control panels and motor control centers in many different applications. Eaton has a handle mechanism for virtually any need.

**Through-the-Door Handle Mechanisms**

Eaton's through-the-door handle mechanisms mount on the front of an enclosure or cabinet door and externally operate the circuit breaker via a variable depth shaft or a linear operator (Type MC). Each rotary type handle mechanism includes a handle, base operating mechanism and shaft that can be cut to various lengths.

Series C Rotary and Universal Rotary handle mechanisms are for use with molded case circuit breakers (G, F, J, K, L, MDL), molded case switches and motor circuit protectors.

Type 4/4X handles are similar to standard handles except they include an internal neoprene gasket. Type 4/4X handle style number is 6648C22G03. Due to gasketing effect between the handle and the housing, the handle may not indicate a tripped position.

**Universal Rotary F-Frame****Direct (Close-Coupled) Handle Mechanisms**

Direct (close-coupled) handle mechanisms mount directly to the circuit breaker. They are used in shallow enclosures where the standard variable depth Through-the-door type mechanism is not practical or cannot be used. They are typically for applications where high volume, standardized enclosures are being fabricated.

The Euro IEC Direct handle mechanism can be used on F- through R-Frames.

The G Direct is available with a black or the yellow handle, and with or without a shroud. It is suitable for use with NEMA 1 enclosures. It is for use only with the G-Frame (GD, GC, GHC, GMCP).

An escutcheon ring and interlock clip are provided as standard. The standard design includes a lock-off feature.

**Flange-Mounted Handle Mechanisms**

Flange-mounted handle mechanisms mount on the flange of an enclosure door. The Flex Shaft is an extra heavy-duty mechanism that includes a flexible shaft in various lengths, 3 feet (0.9m) through 10 feet (3m) for use with various size enclosures.

The Flex Shaft handle will accept up to three padlock shackles, each with a maximum diameter of 3/8-inch (9.5 mm). Can be used with NEMA 1, 3R and 12 fabricated enclosures. An optional handle is available for Flex Shaft that is suitable for use with NEMA 4 and 4X environments. Flex Shaft comes preset from the factory, requiring only minor field adjustments on installation, which takes about 10 minutes—a significant time savings compared to installation of other types of flange handle mechanisms. The Flex Shaft mechanism also takes up less interior enclosure space than competitive designs and the handle fits standard flange cutouts. Flex Shaft handle can be remotely mounted from breaker, where an operator can use it by “funneling” the cable through conduit.

The Type C371 circuit breaker operating mechanisms are designed for installation in control enclosures where main or branch circuit protective devices are required. All circuit breaker mechanisms are suitable for right-hand mounting.

Auxiliary contacts are not available for mounting on operating mechanisms. Where required, have them installed in circuit breaker.

**Handle Extension**

Handle extension is not included with J, K, L, M and N-Frame breakers. It must be purchased separately.

**Standards and Certifications**

Type C371 is UL Listed under File E62635.

Flex Shaft is UL Listed under File E64983 and meets CSA requirements.

Series C Rotary and Universal Rotary, are UL Listed and meet CSA requirements. Universal Rotary also meets IEC 60947-1 and IEC 60947-2 for international compliance. Rotary UL File Number is E64983.

The Universal Direct handle mechanism is UL 489 Listed, IEC 60947-1 and IEC 60947-2, and meets CSA requirements. The Euro IEC Direct handle mechanism is IEC-240-1. G Direct is UL Listed and meets CSA requirements.



## Handle Mechanisms



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## High-Performance Rotary Handle Mechanisms

## Product Description

The high-performance rotary handle mechanism uses a simple, yet robust design to make installation and operation easy. The external handle's key functional components are all metallic, ensuring reliability. The metal-on-metal interface between the handle and shaft prevents contaminant buildup that could impede operation, while UV and chemical agent resistant materials protect the handle from heat and fading in direct sunlight, as well as chemicals that may be introduced in harsh environments.

In addition to its robust design features, the handle mechanism has stand-off support that allows for easy operation with a gloved hand. With a shallow profile, the handle can easily be used in applications where an internal or double door is required.

The high-performance external handle can accept padlocks or multi-hasp locks. The door is interlocked when padlocked and cannot be bypassed.

## Features

- NEMA Type 1/3R/12 (IP54) and NEMA Type 4/4X (IP65) ratings
- Black/Blue or Red/Yellow external handle colors
- Three shaft lengths—6, 12 and 24 inches, which can be cut to size to match enclosure depth
- Conveniently packaged as kit containing handle, shaft and mechanism
- Replacement parts are available separately
- Metallic functional components ensure reliability
- Metal-on-metal interface between handle and shaft
- UV and chemical agent-resistant materials protect the handle
- Shallow profile
- Compatible with both Series C and Series G molded case circuit breakers and molded case switch platforms
- Same handle can be used on multiple frames sizes reducing the number of parts needed
- Red and yellow handles to designate emergency disconnecting means
- All handle mechanisms can accept padlocks or multi-hasps for added flexibility
- Fast, easy installation (see video on website for step-by-step instructions)

## Standards and Certifications

The mechanisms for EG, JG and LG breakers have an internal handle that can be operated independent of door position, and locked-out to meet one of the key NFPA requirements (NFPA® 79) and UL 508A disconnect requirements.

- NEMA 1/3R/12, IP54
- NEMA 4/4X, IP65





## Product Selection

## Handle Mechanisms for Series C Frames

2

## Kits Only (Kit Includes Shaft, Mechanism and Handle)—GC/GD- and GMCP-Frame

	Description	Rating Type		GC/GD-Frame	GMCP-Frame
		NEMA	IP	Catalog Number	Catalog Number
<b>S01 Blue Handle</b> 	S01 blue handle, 12-inch shaft	1/3R/12	54	<b>GCHMVD12B / 68C6039G01</b>	<b>GMHMVD12B / 68C6039G05</b>
		4/4X	65	<b>GCHMVD12BX / 68C6039G03</b>	<b>GMHMVD12BX / 68C6039G07</b>
<b>S01 Red Handle</b> 	S01 red handle, 12-inch shaft	1/3R/12	54	<b>GCHMVD12R / 68C6039G02</b>	<b>GMHMVD12R / 68C6039G06</b>
		4/4X	65	<b>GCHMVD12RX / 68C6039G04</b>	<b>GMHMVD12RX / 68C6039G08</b>

## Separate Components for Series C Frames

## Series C Components—Shaft and Mechanism

Frame	Shaft Width	Shaft Length			Mechanism Only
		6-Inch	10-Inch	12-Inch	
GC/GD	6 mm	—	—	<b>66A6013H02</b>	<b>GCHMVD / 2A92095G15</b>
GMCP	6 mm	—	—	<b>66A6013H02</b>	<b>GMHMVD / 2A92095G16</b>
GD	8 mm	<b>66A6010G95</b>	—	<b>66A6010G96</b>	<b>1498D34G90</b>
FD	8 mm	<b>66A6010G95</b>	—	<b>66A6010G96</b>	<b>1498D34G91</b>
JD	10 mm	<b>66A6012G15</b>	—	<b>66A6012G16</b>	<b>1498D34G92</b>
KD	10 mm	<b>66A6012G15</b>	—	<b>66A6012G16</b>	<b>1498D34G93</b>
LD	10 mm	<b>66A6012G15</b>	—	<b>66A6012G16</b>	<b>1498D34G94</b>
MDL	10 mm	<b>66A6012G15</b>	—	<b>66A6012G16</b>	<b>1498D34G95</b>
ND	12 mm	—	<b>66A6013H01</b>	—	<b>69D9101G30</b>
RD	12 mm	—	<b>66A6013H01</b>	—	<b>69D9101G31</b>

**Note**

Shaft guide (68C6048G49) is optional and can be used with any high-performance handle listed above for greater alignment tolerance.

## Series C Components—Handles Only

Frame	Rating Type		Handles Only							
	NEMA	IP	S01 Blue/Black	S01 Red/Yellow	S2 Blue/Black	S2 Red/Yellow	S3 Blue/Black	S3 Red/Yellow	S4 Blue/Black	S4 Red/Yellow
GC/GD	1/3R/12	54	68C6048G41	68C6048G42	—	—	—	—	—	—
	4/4X	65	68C6048G43	68C6048G44	—	—	—	—	—	—
GMCP	1/3R/12	54	68C6048G41	68C6048G42	—	—	—	—	—	—
	4/4X	65	68C6048G43	68C6048G44	—	—	—	—	—	—
GD	1/3R/12	54	68C6048G41	68C6048G42	68C6048G01	68C6048G02	—	—	—	—
	4/4X	65	68C6048G43	68C6048G44	68C6048G03	68C6048G04	—	—	—	—
FD	1/3R/12	54	68C6048G41	68C6048G42	68C6048G01	68C6048G02	—	—	—	—
	4/4X	65	68C6048G43	68C6048G44	68C6048G03	68C6048G04	—	—	—	—
JD	1/3R/12	54	—	—	68C6048G01	68C6048G02	—	—	—	—
	4/4X	65	—	—	68C6048G03	68C6048G04	—	—	—	—
KD	1/3R/12	54	—	—	68C6048G01	68C6048G02	—	—	—	—
	4/4X	65	—	—	68C6048G03	68C6048G04	—	—	—	—
LD	1/3R/12	54	—	—	68C6048G01	68C6048G02	68C6048G05	68C6048G06	—	—
	4/4X	65	—	—	68C6048G03	68C6048G04	68C6048G07	68C6048G08	—	—
MDL	1/3R/12	54	—	—	68C6048G01	68C6048G02	68C6048G05	68C6048G06	—	—
	4/4X	65	—	—	68C6048G03	68C6048G04	68C6048G07	68C6048G08	—	—
ND	1/3R/12	54	—	—	—	—	68C6048G05	68C6048G06	68C6048G09	68C6048G10
	4/4X	65	—	—	—	—	68C6048G07	68C6048G08	68C6048G11	68C6048G12
RD	1/3R/12	54	—	—	—	—	—	—	68C6048G09	68C6048G10
	4/4X	65	—	—	—	—	—	—	68C6048G11	68C6048G12

**Note**

Shaft guide (68C6048G49) is optional and can be used with any high-performance handle listed above for greater alignment tolerance.

# 2.7

## Molded Case Circuit Breakers

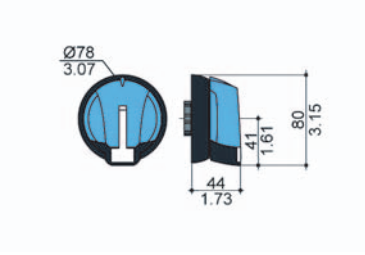
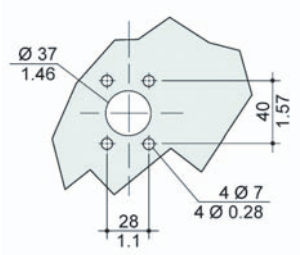
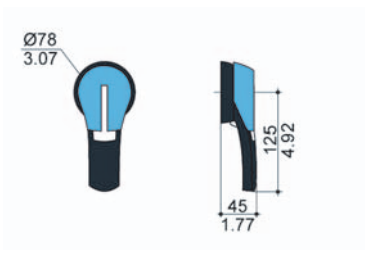
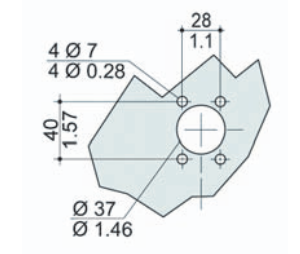
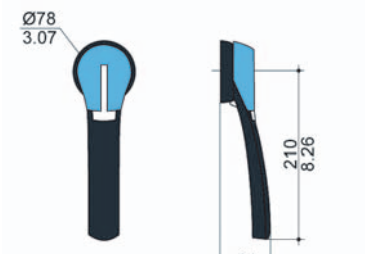
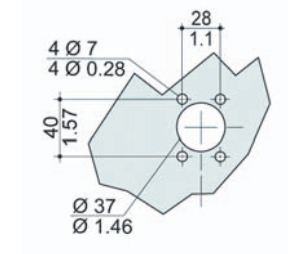
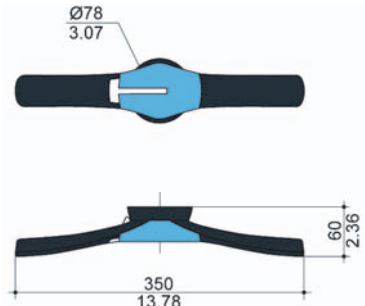
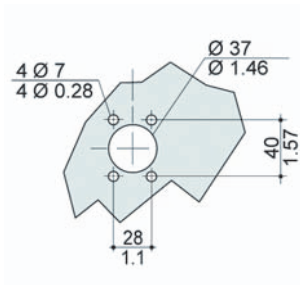
### Handle Mechanisms

#### Dimensions

Approximate Dimensions in mm (Inches)

2

#### High-Performance Rotary Handle Mechanisms

Handle Type	Front Operation Direction of Operation	Door Drilling
<b>Type S01</b>		
<b>Type S2</b>		
<b>Type S3</b>		
<b>Type S4</b>		

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Series C Rotary

Product Description

Eaton’s through-the-door handle mechanisms mount on the front of an enclosure or a cabinet door and externally operate the circuit breaker via a variable depth shaft or a linear operator (Type MC). Each rotary type handle mechanism includes a handle, a base operating mechanism and a shaft that can be cut to various lengths.

Series C Rotary handle mechanisms are used with molded case circuit breakers (G, F, J, K, L, MDL), molded case switches and motor circuit protectors.

These rotary handles are robust and durable, made entirely of metal parts. It also has a lock-out tag-out level at the tip of the handle for padlocking.

NEMA Type 4/4X handles are similar to standard handles except they include an internal neoprene gasket. NEMA Type 4/4X handle style number is 6648C22G03. Due to gasketing effect between the handle and the housing, the handle may not indicate a tripped position.

Standards and Certifications

Series C Rotary is UL listed and meets CSA requirements.



Features

Features Comparison of Series C Rotary and Universal Rotary Handle Mechanism

Rotary	Number of Poles	NEMA Enclosure Type				Handle Lock-Off ②	Handle Indication: ON/OFF TRIPPED/RESET	International Markings ON (I) OFF (O)	Handle Material	Available Handle Colors	Handle Rotation	Shaft Lengths (Inches)
		1	3R	12	4/4X ①							
Series C rotary	—	■	■	■	■	■	■	■	Metal	Black	45 deg.	6, 12, 16, 24
Universal rotary	—	■	—	■	—	■	■	■	Molded plastic	Yellow/Red/Black	90 deg.	6, 12, 24

Notes

- ① Type 4/4X application requires special handle. See “Ordering Information.”
- ② All rotary handle mechanisms include a handle “Lock Off” to prevent turning the breaker ON while in the OFF position.



## Product Selection

## Through-the-Door Handle Mechanisms

2

## Series C Rotary

## Series C Rotary Ordering Information



Shaft Length Inches (mm)	Complete Catalog Number ①	Separate Catalog Number		Shaft ④	Catalog Number	
		Standard Handle ②	Breaker Mechanism ③		IEC IP65 ⑤⑥	IEC IP66 ⑤⑥
<b>F-Frame</b>						
6.00 (152.4)	HM1R06	6648C22G25	6648C23G11	4217B37G08	WHM1R06	WHM1R06X
12.00 (304.8)	HM1R12	6648C22G25	6648C23G11	4217B37G05	WHM1R12	WHM1R12X
16.00 (406.4)	HM1R16	6648C22G25	6648C23G11	4217B37G06	WHM1R16	WHM1R16X
24.00 (609.6)	HM1R24	6648C22G25	6648C23G11	4217B37G07	WHM1R24	WHM1R24X
<b>J-Frame</b>						
6.00 (152.4)	HM2R06	6648C22G01	6648C23G21	4217B37G08	WHM2R06	WHM2R06X
12.00 (304.8)	HM2R12	6648C22G01	6648C23G21	4217B37G05	WHM2R12	WHM2R12X
16.00 (406.4)	HM2R16	6648C22G01	6648C23G21	4217B37G06	WHM2R16	WHM2R16X
24.00 (609.6)	HM2R24	6648C22G01	6648C23G21	4217B37G07	WHM2R24	WHM2R24X
<b>K-Frame</b>						
6.00 (152.4)	HM3R06	6648C22G01	6648C23G25	4217B37G08	WHM3R06	WHM3R06X
12.00 (304.8)	HM3R12	6648C22G01	6648C23G25	4217B37G05	WHM3R12	WHM3R12X
16.00 (406.4)	HM3R16	6648C22G01	6648C23G25	4217B37G06	WHM3R16	WHM3R16X
24.00 (609.6)	HM3R24	6648C22G01	6648C23G25	4217B37G07	WHM3R24	WHM3R24X
<b>L- and MDL-Frame</b>						
6.00 (152.4)	HM4R06	6648C22G11	6648C23G19	4217B37G08	WHM4R06	WHM4R06X
12.00 (304.8)	HM4R12	6648C22G11	6648C23G19	4217B37G05	WHM4R12	WHM4R12X
16.00 (406.4)	HM4R16	6648C22G11	6648C23G19	4217B37G06	WHM4R16	WHM4R16X
24.00 (609.6)	HM4R24	6648C22G11	6648C23G19	4217B37G07	WHM4R24	WHM4R24X
<b>MD/MDS</b>						
6.00 (152.4)	HM7R06	6648C22G21	6648C23G17	4217B37G08	—	—
12.00 (304.8)	HM7R12	6648C22G21	6648C23G17	4217B37G05	—	—
16.00 (406.4)	HM7R16	6648C22G21	6648C23G17	4217B37G06	—	—
24.00 (609.6)	HM7R24	6648C22G21	6648C23G17	4217B37G07	—	—
<b>N-Frame</b>						
6.00 (152.4)	HM5R06	6648C22G21	6648C23G08	4217B37G08	WHM5R06	WHM5R06X
12.00 (304.8)	HM5R12	6648C22G21	6648C23G08	4217B37G05	WHM5R12	WHM5R12X
16.00 (406.4)	HM5R16	6648C22G21	6648C23G08	4217B37G06	WHM5R16	WHM5R16X
24.00 (609.6)	HM5R24	6648C22G21	6648C23G08	4217B37G07	WHM5R24	WHM5R24X

**Notes**

- ① Complete catalog number includes the standard handle, mechanism, shaft and support brace/bracket.
- ② Handle is designed suitable for NEMA Types 1, 3R and 12 enclosures. Use style number **6648C22G03** for Type 4/4X handle or add **X** Suffix to complete catalog number. Handle is cast aluminum.
- ③ Breaker mechanism includes a shaft support bracket and its parts. Shaft is 50-inch (12.7 mm).
- ④ Longer shafts, 16-inch (406.4 mm) and 24-inch (609.6 mm), include an adjustable support extension.
- ⑤ IEC handle mechanism supplied with metric thread mounting hardware.
- ⑥ Complete catalog number includes a handle, mechanism and shaft.

Handle Mechanisms



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Universal Rotary

Product Description

Eaton’s Universal Rotary is suitable for use with Type 1 or 12 enclosure types. All rotary handle mechanisms include a handle “lock off” to prevent turning the breaker ON while in the OFF position, and indicate ON/OFF/Tripped/Reset positions. The Universal Rotary has the added feature of international markings for ON (I) and OFF (O). The Universal Rotary is made of molded material.

The Universal Rotary mechanisms for EG-, JG- and LG-Frame MCCBs can be operated by hand with the door open or “locked off” to prevent operation with the door open.

Standards and Certifications

Universal Rotary is UL listed and meets CSA requirements. Universal Rotary also meets IEC 60947-1 and IEC 60947-2 for international compliance. Rotary UL File Number is E64983.



Features

Features Comparison of Series C Rotary and Universal Rotary Handle Mechanism

Rotary	Number of Poles	NEMA Enclosure Type				Handle Lock-Off ②	Handle Indication: ON/OFF TRIPPED/RESET	International Markings ON (I) OFF (O)	Handle Material	Available Handle Colors	Handle Rotation	Shaft Lengths (Inches)
		1	3R	12	4/4X ①							
Series C rotary	—	■	■	■	■	■	■	■	Metal	Black	45 deg.	6, 12, 16, 24
Universal rotary	—	■	—	■	—	■	■	■	Molded plastic	Yellow/Red/Black	90 deg.	6, 12, 24

Notes

- ① Type 4/4X application requires special handle. See “Ordering Information.”
- ② All rotary handle mechanisms include a handle “Lock Off” to prevent turning the breaker ON while in the OFF position.

## Product Selection

## Universal Rotary F-Frame

2

Universal Rotary  
F-FrameSeries C Universal Rotary <sup>①</sup>

Handle Color	Shaft Length in Inches (mm)	Complete Catalog Number
<b>G-Frame</b>		
Black	6.00 (152.4)	<b>GHMVD06B</b>
	12.00 (304.8)	<b>GHMVD12B</b>
Red	6.00 (152.4)	<b>GHMVD06R</b>
	12.00 (304.8)	<b>GHMVD12R</b>
<b>F-Frame</b>		
Black	6.00 (152.4)	<b>FHMVD06B</b>
	12.00 (304.8)	<b>FHMVD12B</b>
Red	6.00 (152.4)	<b>FHMVD06R</b>
	12.00 (304.8)	<b>FHMVD12R</b>
<b>J-Frame</b>		
Black	6.00 (152.4)	<b>JHMVD06B</b>
	12.00 (304.8)	<b>JHMVD12B</b>
Red	6.00 (152.4)	<b>JHMVD06R</b>
	12.00 (304.8)	<b>JHMVD12R</b>
<b>K-Frame</b>		
Black	6.00 (152.4)	<b>KHMVD06B</b>
	12.00 (304.8)	<b>KHMVD12B</b>
Red	6.00 (152.4)	<b>KHMVD06R</b>
	12.00 (304.8)	<b>KHMVD12R</b>
<b>L-Frame</b>		
Black	6.00 (152.4)	<b>LHMVD06B</b>
	12.00 (304.8)	<b>LHMVD12B</b>
Red	6.00 (152.4)	<b>LHMVD06R</b>
	12.00 (304.8)	<b>LHMVD12R</b>

**Note**

<sup>①</sup> Only available as complete handle mechanism. Parts not sold separately.

Handle Mechanisms



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**Direct (Close-Coupled) Handle Mechanisms**

**Product Description**

Direct (close-coupled) handle mechanisms mount directly to the circuit breaker. They are used in shallow enclosures where the standard variable depth Through-the-door type mechanism is not practical or cannot be used.

The Universal Direct handle mechanisms are rated Type 1 and Type 12.

The Universal Direct handle mechanism is available as standard with a door interlock to prevent opening the enclosure while the circuit breaker is in the ON position. It is also available without a door interlock.

**Application Description**

Direct (close-coupled) handle mechanisms are typically used for applications where high volume, standardized enclosures are being fabricated.

**Standards and Certifications**

The Universal Direct handle mechanism is IEC 60947-1 and IEC 60947-2 compliant.

**Product Selection****Direct (Close-Coupled) Handle Mechanisms**

2

**Euro IEC Direct**

Frame	Black Handle Catalog Number
F	HMCC1B
J	HMCC2B
K	HMCC3B
L and M	HMCC4B
N	HMVD5B
R	HMVD6B

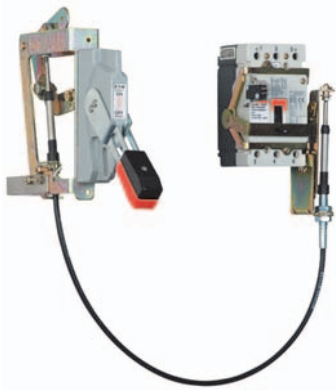
**G Direct** <sup>①</sup>

Frame	Black Handle		Yellow Handle	
	With Shroud Catalog Number	Without Shroud Catalog Number	With Shroud Catalog Number	Without Shroud Catalog Number
GD/GHC	HRGCC1S	HRGCC10	HRGCC3S	HRGCC30
GMCP	HRGMC1S	HRGMC10	HRGMC3S	HRGMC30

**Note**

<sup>①</sup> Suitable for use on two- or three-pole G-Frame.

Handle Mechanisms



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**Flex Shaft**

**Product Description**

**Flange-Mounted Handle Mechanisms**

Flange-mounted handle mechanisms mount on the flange of an enclosure door. The Flex Shaft is an extra heavy-duty mechanism that includes a flexible shaft in various lengths, 3 feet (0.9m) through 10 feet (3m) for use with various size enclosures.

The Flex Shaft handle will accept up to three padlock shackles, each with a maximum diameter of 3/8 inches (9.5 mm). It can be used with Type 12 fabricated enclosures. An optional handle is available for Flex Shaft that is suitable for use with Type 4 environments.

Flex Shaft comes preset from the factory, requiring only minor field adjustments on installation, which takes about 10 minutes—a significant time savings compared to installation of other types of flange handle mechanisms. The Flex Shaft mechanism also takes up less interior enclosure space than competitive designs, and the handle fits standard flange cutouts. Flex Shaft handle can be remotely mounted from breaker, where an operator can use it by “funneling” the cable through conduit.

**Standards and Certifications**

Flex Shaft is UL listed under File E64983 and meets CSA requirements.



# 2.7

## Molded Case Circuit Breakers

### Handle Mechanisms

#### Product Selection

Approximate Dimensions in Inches (mm)

2

#### Handle Mechanisms

##### Flex Shaft

Breaker Frame	Flexible Shaft Length in Feet (m)							
	3 (0.9) Catalog Number	4 (1.2) Catalog Number	5 (1.5) Catalog Number	6 (1.8) Catalog Number	7 (2.1) Catalog Number	8 (2.4) Catalog Number	9 (2.7) Catalog Number	10 (3.0) Catalog Number
G ①	F0S03C	F0S04C	F0S05C	F0S06C	—	—	—	—
F	F1S03C	F1S04C	F1S05C	F1S06C	F1S07C	F1S08C	F1S09C	F1S10C
F (dual)	F1S03CD	F1S04CD	F1S05CD	F1S06CD	F1S07CD	F1S08CD	F1S09CD	F1S10CD
J	F2S03C	F2S04C	F2S05C	F2S06C	F2S07C	F2S08C	F2S09C	F2S10C
K	F3S03C	F3S04C	F3S05C	F3S06C	F3S07C	F3S08C	F3S09C	F3S10C
L and MDL	—	F4S04C	F4S05C	F4S06C	—	—	—	F4S10C
N	—	F5S04C	F5S05C	F5S06C	—	—	—	F5S10C
R	—	F6S04	F6S05	F6S06	—	—	—	—
MD, MDS (old)	—	F7S04	F7S05	F7S06	—	—	—	F7S10C

#### Flange-Mounted Handle Mechanisms

##### Type C371

Circuit Breaker or Motor Circuit Protector	Frame Size	Variable Depth Mounting Range Min./Max. ②③	Operating Mechanism Only ④	Operating Mechanism w/ 4-Inch Handle	
				For NEMA 1-12 Enclosure Catalog Number	For NEMA 4/4X Enclosure Catalog Number
HMCP and Series C EHD, FDB, FD, FDC, HFD, ED	150	6.50–16 (165.1–406.4)	C371E	C371E1	C371E2
HMCP and Series C HJD, JD, JDB, JDC	250	6.50–16.63 (165.1–422.4)	C371F	C371F5	C371F6
HMCP and Series C DK, HKD, KD, KDB	400	6.50–16.63 (165.1–422.4)	C371F	C371F5	C371F6
Series C HLD, LD, LDC	600	8.50–22 (215.9–558.8)	C371G	C371G5	C371G6
Series C MD, MDS (No MDL)	800	8.75–22 (222.3–558.8)	C371K	C371K5	C371K6
Series C HND, ND, NDC	1200	9.75–22 (247.7–558.8)	C371K	C371K5	C371K6

#### Notes

- ① Suitable for GC/GD MCCB; not suitable for GMCP.
- ② For increased maximum allowable depth, see connecting rods on [Page V4-T2-433](#).
- ③ Dimensions shown are from panel flange surface.
- ④ Does not include handle.

Type 4/4X handle mechanisms are available. Add Suffix **X** to complete catalog number. Add Suffix **I** to complete catalog number for IEC handle. Original narrow handle design (No C Suffix) is available. Remove C from catalog number.

When selecting the length of shaft, ensure minimum bending radius of 4 inches (101.6 mm) (5 inches, 127 mm for L-, N- and R-Frames) is maintained to operate properly. The standard method of shipment includes the mechanism preset at the factory; however, minor field adjustments may be required.

Dual breakers operator available on F-Frame only. Only the F, J and K can mount LH and RH all other RH only.

Approximate Dimensions in Inches (mm)

### Handle Only

Circuit Breaker Frame Size (Amperes)	NEMA Enclosure Type	Operating Handle Length	Catalog Number
150	1/3R/3/12	4.00 (101.6)	<b>C371H1</b>
	4/4X	4.00 (101.6)	<b>C371H2</b>
	1/3R/3/12	6.00 (152.4)	<b>C371H3</b>
	4/4X	6.00 (152.4)	<b>C371H4</b>
250–1200	1/3R/3/12	4.00 (101.6)	<b>C371H5</b>
	4/4X	4.00 (101.6)	<b>C371H6</b>
	1/3R/3/12	6.00 (152.4)	<b>C371H7</b>
	4/4X	6.00 (152.4)	<b>C371H8</b>

### Channel Support Kit (Rod Not Supplied)

For use to prevent bending of the operating handle mounting surface. This is especially useful when the operating handle is mounted on a channel in a multi-door enclosure.

Amperes	Catalog Number
600–1200	<b>C371CS6</b>

### Connecting Rods <sup>①</sup>

Application	Catalog Number
Disconnect switches (30, 60, 100, 200A sizes)	<b>C371CS1</b>
Circuit breakers (150, 250, 400A sizes)	<b>C371CS1</b>
Circuit breakers (600, 800, 1200A sizes)	<b>C371CS2</b>

#### Note

<sup>①</sup> Increase maximum allowable depth by 5 inches (127 mm).



**Handle Extension**



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**Handle Extension**

**Product Description**

- Suitable for use on two- or three-pole G-Frame
- Not included with J, K, L, M and N-Frame breakers; it must be purchased separately
- Included with R-Frame breakers

**Product Selection**

**Handle Extension**



**Handle Extension** ①②

Frame	Style Number
J, K	HEX3
L, M	HEX4
N	HEX5
R	HEX6

**Notes**

- ① Handle extension is not included with J, K, L, M and N-Frame breakers. It must be purchased separately.
- ② Handle extension is included with breaker with R-Frame breakers.

# Power Breakers, Contactors and Fuses

Power Breakers, Contactors  
and Fuses Family



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**Power Circuit Breaker**



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**Low Voltage Power Circuit Breakers**

**Product Overview**

**Magnum Low Voltage Power Circuit Breakers for Global Application**

Magnum™ Low Voltage Power Circuit Breakers enable comprehensive solutions to meet and exceed the unique and wide-ranging requirements of today's global power distribution systems. This powerful circuit breaker offering is designed for ultimate custom configuration and application flexibility, with the needs of the power distribution equipment user and the electrical equipment manufacturer in mind.

**Three Product Families**

Magnum consists of three product families; each provides specific ratings features and approvals to optimize performance when applied in power distribution equipment and custom enclosures:

**Magnum DS Low Voltage Power Circuit Breakers for ANSI Rated Switchgear Applications**

- Up to 635 Vac
- 200 to 6000A continuous
- 42 to 200 kA interrupting



**Magnum DS Low Voltage Power Circuit Breaker Family ANSI Rated for Switchgear Applications**

**Magnum SB Low Voltage Insulated Case Circuit Breakers for Switchboard Applications**

- Up to 635 Vac
- 200 to 5000A continuous
- 50 to 150 kA interrupting



**Magnum SB Low Voltage Insulated Case Circuit Breaker Family UL Rated for Switchboard Applications**

**Magnum IEC Air Circuit Breakers for IEC Rated Switchboards**

- Up to 690 Vac
- 200 to 6300A continuous
- 40 to 105 kA  $I_{cu}/I_{cs}$



**Magnum IEC Low Voltage Air Circuit Breaker Family**

### Features, Benefits and Functions

- **200 kA interruption ratings** with current limiting performance and low current let-through to reduce damaging energy to downstream equipment at high fault levels
- **Withstand ratings up to 100 kA** to maximize system coordination and selectivity
- **Four physical frame sizes** (Narrow, Standard, Double Narrow and Double) to promote breaker application in compact modular enclosures and improve enclosure density
- **Continuous current ratings from 800 to 6300A** with 100% rating at 104°F (40°C) and no derating on most ratings up to 122°F (50°C)
- **Fixed breaker mounting configurations** with horizontal and optional vertical and front connected terminal connections
- **Drawout breaker mounting configurations** with cassette and optional safety shutters
- **Three- and four-pole breaker configurations**
- **Through-the-door design** for human interface with the breaker compartment door closed
- **Two-step stored energy mechanism** for manually and electrical operated breakers
- **Digitrip™ RMS Trip Unit family protection** with four models each providing increasing levels of protection and feature options for coordination, information and diagnostics:
  - Microprocessor-based rms sensing
  - Basic to programmable overcurrent protection and alarms
  - Local display for information, status and diagnostics
  - Ampere, voltage and power metering
  - Power quality, harmonics and waveform capture
  - Communications with translators to common protocols
  - Zone selective interlocking for improved coordination
  - Integral Arcflash Reduction Maintenance System™
  - Breaker health monitoring
- **Field-installable accessories** (UL® listed) common across the breaker frames and designed to be easily installed in the field to service or modify the breaker at the point of use
- **Secondary terminal contacts** mounted at the top front of the breaker and away from the primary voltage areas for improved safety and access. Finger-safe terminal blocks accommodate ring-tongue or spade type terminals as standard



*Through-the-Door Design for Human Interface with the Breaker Compartment Door Closed*



*High Technology Microprocessor-Based Digitrip RMS 1150+ Trip Units are Available With Advanced Features Like Programmable Overcurrent Settings, Power Metering, Power Quality and Communications*

# 3.1

## Power Breakers, Contactors and Fuses

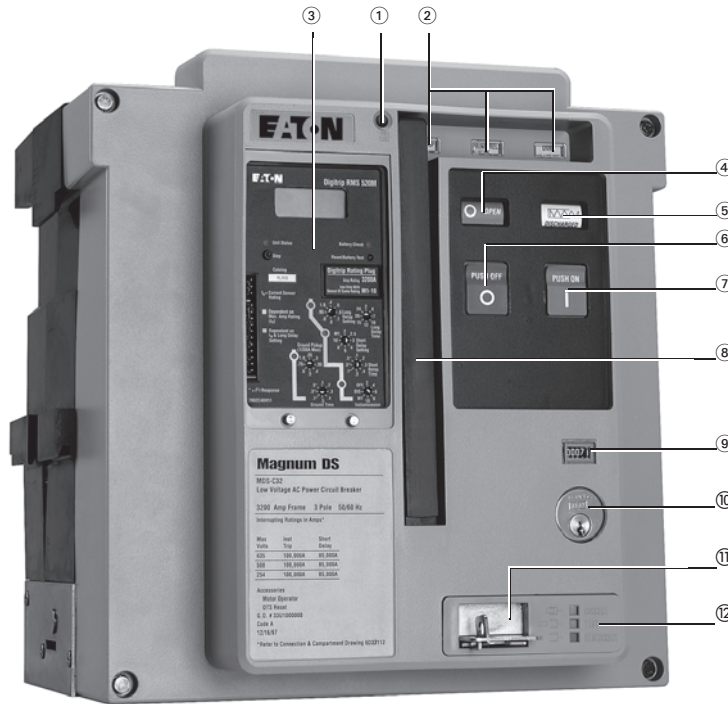
### Power Circuit Breakers

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#### Breaker Features on Front Cover

The controls and indicators are functionally grouped on the breaker faceplate to optimize the human interface, visibility and ease of use. For maximum safety, a modern, through-the-door design permits access to the breaker levering system, trip unit, controls and indicators with the door closed.

#### Magnum DS Drawout Breaker



- ① Red Mechanical Trip Flag Pop-out Indicator (Optional)—Interlocked Indicator Requiring Manual Reset is also Available
- ② Accessory Viewing Windows for:
  - Shunt Trip Attachment (STA)
  - Spring Release Device (SR)
  - Undervoltage Release (UVR) Device or Second STA
- ③ Digitrip RMS Trip Unit (Model 520M Shown) Protected by Clear Cover
- ④ Contact Status Indicators:
  - OPEN—Green
  - CLOSED—Red
- ⑤ Spring Status Indicators:
  - Charged—Yellow
  - Discharged—White
- ⑥ Push OFF (Open) Pushbutton—Red
- ⑦ Push ON (Close) Pushbutton—Green
- ⑧ Manual Spring Charging Handle for Manually Charging the Stored Energy Springs
- ⑨ Mechanical Operations Counter (Optional)
- ⑩ Key Off Lock (Optional)
- ⑪ Padlockable Levering Device Shutter for Drawout Breakers
- ⑫ Color-Coded Position Indicator for Drawout Breakers:
  - CONNECT—Red
  - TEST—Yellow
  - DISCONNECT—Green



**Accessory Viewing Windows Visibly Confirm the Breaker Shunt Trip, Spring Release, and UVR Installation and Their Control Voltage Rating**



**Through-the-Door Design for Human Interface with the Breaker Compartment Door Closed, for Example, Manually Charging the Stored Energy Springs**



**Drawout Breaker Levering Can be Accomplished With the Compartment Door Closed Without the Need for a Special Levering Tool**

**Breaker Internal Features**

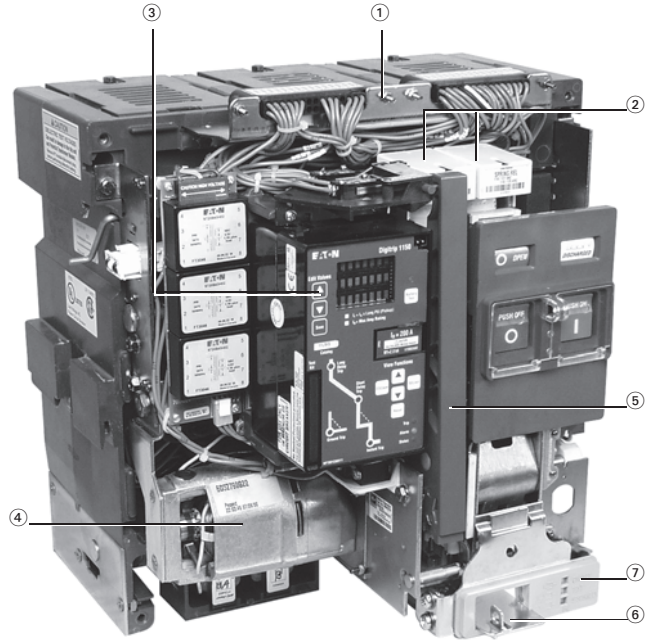
Magnum is designed for ease of access for inspection, modification and maintenance at the point of use. The breaker front cover is easily removed with four captive bolts, revealing the modular internal breaker features.

- ① Secondary Terminal Points for Internal Breaker Wiring Connections
- ② Breaker Accessory Mounting Deck with Three Positions for Mounting:
  - Shunt Trip Attachment (STA)
  - Spring Release Device (SR)
  - Undervoltage Release (UVR) Device or Second STA
- ③ Digitrip RMS Trip Unit (Model 1150+ Shown)
- ④ Spring Charging Motor (Optional) for Electrically Charging the Stored Energy Springs
- ⑤ Manual Spring Charging Handle for Manually Charging the Stored Energy Springs

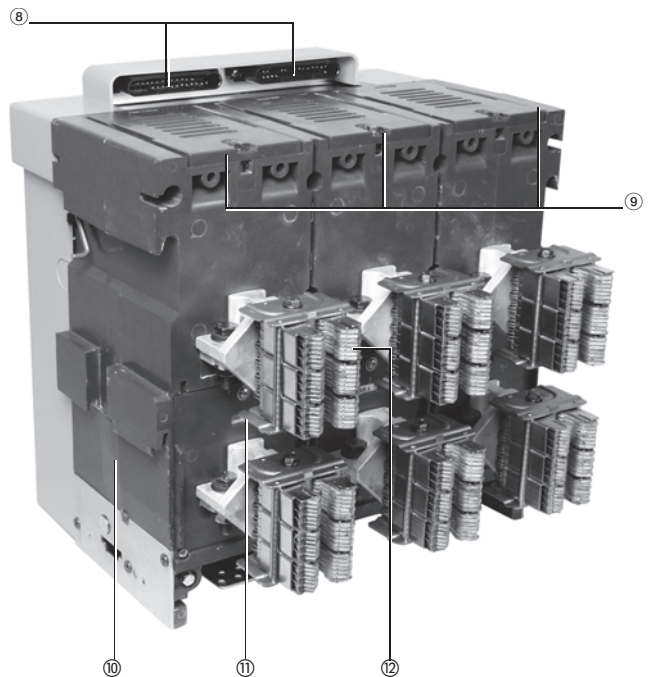
- ⑥ Padlockable Levering Device Shutter for Drawout Breakers
- ⑦ Color-Coded Position Indicator for Drawout Breakers:
  - CONNECT—Red
  - TEST—Yellow
  - DISCONNECT—Green
- ⑧ Secondary Contact Blocks for Connection to External Cell Control Wiring
- ⑨ Removable Arc Chute Covers for Easy Access to Breaker Main Contacts
- ⑩ Primary Finger Cluster Disconnecting Contacts for Drawout Breaker are Mounted on the Breaker Element (Not in the Breaker Compartment) for Ease of Access for Inspection and Maintenance

**Note:** Some competitors mount the primary finger clusters inside the cell, requiring shutdown of the switchgear for inspection and maintenance.

- ⑪ Current Sensor Viewing Windows to View and Confirm Breaker Sensor Rating
- ⑫ Rigid Frame Housing (Thermoset Composite Resin) Providing Increased Strength and Durability



**Magnum Drawout Breaker Front View With Front Cover Removed Showing Easy Access to the Breaker Internal Devices**



**Magnum Drawout Breaker Rear View Showing Primary Disconnecting Finger Clusters Mounted on the Breaker for Ease of Inspection**

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## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

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#### Magnum DS, MDSX and MDSL Circuit Breakers



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Magnum IEC Rated Air Circuit Breakers . . . . .	<b>V4-T3-18</b>
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Medium Voltage Circuit Breakers . . . . .	<b>V4-T3-34</b>

### Magnum DS Low Voltage Power Circuit Breakers

#### Product Description

Magnum DS is a true UL 1066 listed low voltage power circuit breaker family, designed for the highest performance requirements of switchgear and specialty enclosure applications.

- Magnum DS Low Voltage Power Circuit Breakers have interrupting ratings up to 200 kA at 480 Vac, and short-time withstand ratings up to 100 kA at 635 Vac with continuous current ratings up to 6000A to maximize system coordination and selectivity
- Magnum MDSX Current Limiting Power Circuit Breakers have 200 kA interrupting ratings at 480 Vac with continuous current ratings up to 5000A
- Magnum MDSL Current Limiting Power Circuit Breakers have 200 kA interrupting ratings at 600 Vac with continuous current ratings up to 2000A



*The Magnum MDSL Current Limiting Power Circuit Breakers have integral current limiters to provide interrupting ratings of 200 kA at 600 Vac.*



*The Magnum MDSX Current Limiting Power Circuit Breakers have fast opening contacts to provide interrupting ratings up to 200 kA at 480 Vac without fuses.*

#### Standards and Certifications

##### UL and ANSI Test Certifications

Magnum DS meets or exceeds the applicable ANSI, NEMA®, UL and CSA® standards, including:

- ANSI C37.13 (Low Voltage AC Power Circuit Breakers Used in Enclosures)
- ANSI C37.16 (Preferred Ratings, Related Requirements, and Application Recommendations for Low Voltage Power Circuit Breakers and AC Power Circuit Breakers)
- ANSI C37.17 (Trip Devices for AC and General Purpose DC Low Voltage Power Circuit Breakers)
- ANSI C37.50 (Test Procedures for Low Voltage AC Power Circuit Breakers Used in Enclosures)
- UL 1066 (Standard for Low Voltage AC and DC Power Circuit Breakers Used in Enclosures)
- NEMA SG3 (This standard adopts ANSI C37.16 in its entirety)

and switchboards with the following test certifications:

- UL 1558 (Certified Magnum DS Low Voltage Metal-Enclosed Switchgear)
- UL 891 (Certified Pow-R-Line™ Low Voltage Switchboards)
- UL 1008 Standard for Transfer Switch Equipment
- UL, CSA 22.2.31 Low Voltage Assemblies

##### Approvals and Marks

- UL listed: Magnum DS Breaker UL File No. E52096 and Cassette UL File No. E204565
- ABS (American Bureau of Shipping) Type Listed Certificate Number 04-HS422844A-DUB
- Additional Magnum DS approvals and certificates can be found on [www.eaton.com](http://www.eaton.com)



##### Product Selection

Contact Eaton for pricing.

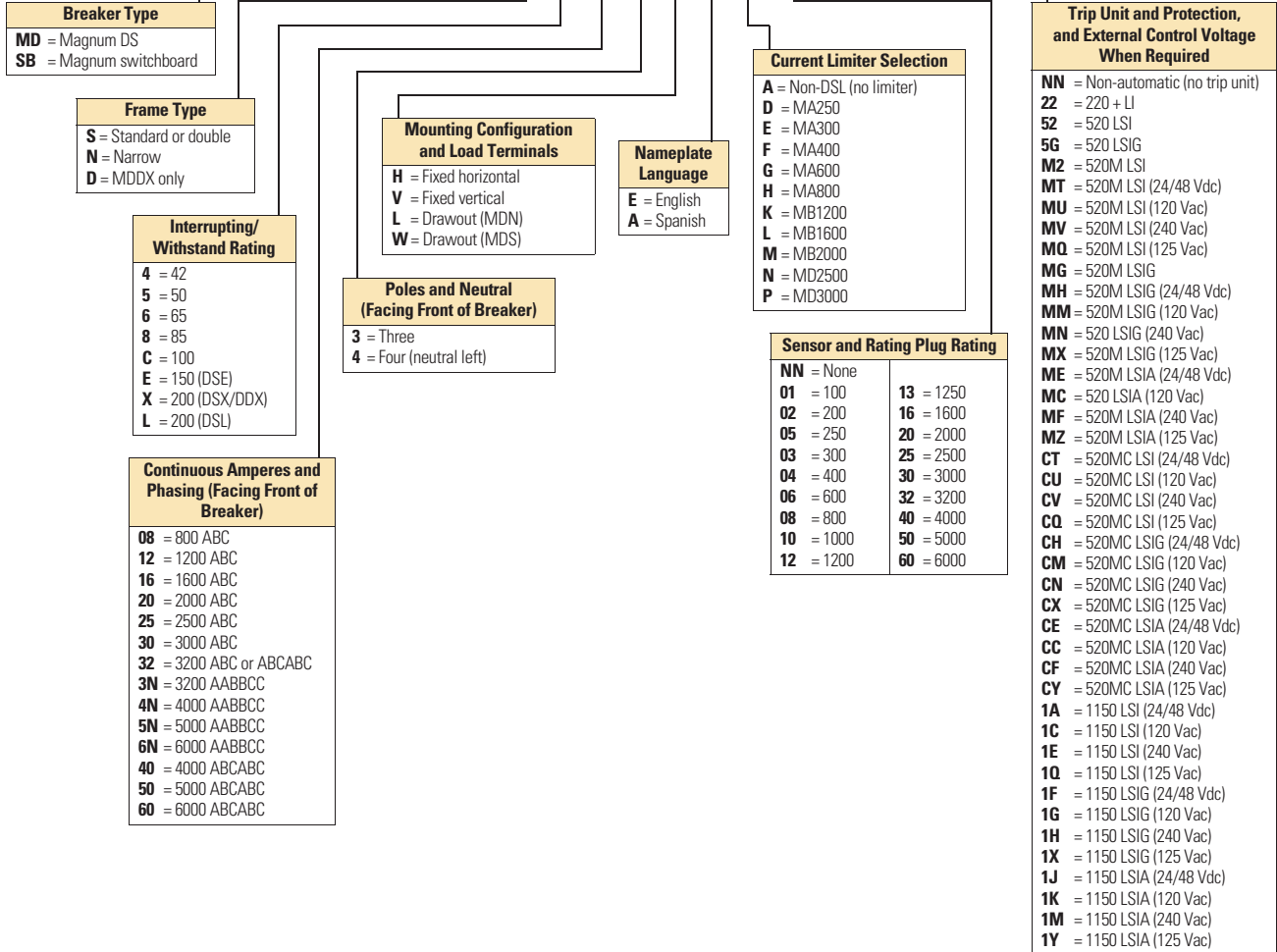
##### Comprehensive Enclosure Solutions

Magnum DS has proven performance in Eaton manufactured switchgear

Catalog Number Selection

Magnum DS ANSI Breaker Product Family

**MD S 4 12 3 V E A 06 MU**





# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### Magnum DS ANSI Breaker Product Family, continued

3

**A W C H N E H K L A X**

**Shunt Trip (ST)**

**N** = None  
**A** = 110–127 Vac/dc  
**R** = 208–240 Vac/dc  
**C** = 24 Vdc  
**H** = 48 Vdc  
**B** = 110–127 Vac/dc (100% duty)  
**S** = 220–250 Vac/dc (100% duty)  
**D** = 24 Vdc (100% duty)  
**K** = 48 Vdc (100% duty)  
**J** = 60 Vdc (100% duty)  
**6** = 60 Vdc

**Motor Operator**

**M** = Manual operated  
**N** = 110–125 Vac (5-sec)  
**W** = 110–125 Vdc (5-sec)  
**T** = 220–250 Vdc (5-sec)  
**P** = 220–240 Vdc (5-sec)  
**L** = 24 Vdc (5-sec)  
**K** = 48 Vdc (5-sec)  
**S** = 60 Vdc (5-sec)

**Spring Release Device (SRD)**

**N** = None  
**A** = 110–127 Vac/dc  
**R** = 208–240 Vac/dc  
**C** = 24 Vdc  
**H** = 48 Vdc  
**S** = 60 Vdc

**Undervoltage Release (UVR) or 2nd Shunt Trip (ST)**

**N** = None  
**A** = UVR (110–127 Vac)  
**R** = UVR (208–240 Vac)  
**C** = UVR (24 Vdc)  
**H** = UVR (48 Vdc)  
**D** = UVR (60 Vdc)  
**E** = UVR (110–125 Vdc)  
**F** = UVR (220–250 Vdc)  
**G** = UVR (32 Vdc)  
**X** = UVR (380–415 Vac)  
**J** = UVR (480 Vac)  
**K** = UVR (600 Vac)  
**1** = 2nd ST (110–127 Vac/dc)  
**2** = 2nd ST (208–250 Vac/dc)  
**3** = 2nd ST (24 Vdc)  
**4** = 2nd ST (48 Vdc)  
**6** = 2nd ST (60 Vdc)  
**B** = 2nd ST (110–127 Vac/dc 100% duty)  
**O** = 2nd ST (220–250 Vac/dc 100% duty)  
**I** = 2nd ST (24 Vdc 100% duty)  
**Q** = 2nd ST (48 Vdc 100% duty)  
**9** = 2nd ST (60 Vdc 100% duty)

**Auxiliary Switch**

**N** = None  
**2** = 2A/2B  
**4** = 4A/4B  
**6** = 6A/6B

**Bell Alarms Switch (OTS) with 2a/2b Contacts and/or Mechanical Trip Indicator**

	OTS 2a/2b	Trip Indicator
<b>E</b> =	No OTS	No indicator
<b>N</b> =	No OTS	With indicator
<b>Y</b> =	With OTS	With indicator
<b>M</b> =	No OTS	With interlocked indicator
<b>L</b> =	With OTS	With interlocked indicator

**Padlock Provisions for Blocking Close and/or Open ACB Manual Pushbuttons**

**N** = None  
**M** = Metal (block close and open)  
**P** = Plastic (block close and open)  
**C** = Metal (block close only)  
**H** = Plastic (block close only)  
**S** = Metal swbd lock-off (block close, depress open)

**Operations Counter and/or Keylock Provisions**

	Counter	Keylock Provisions
<b>N</b> =	No counter	No locks
<b>K</b> =	No counter	Kirk lock
<b>C</b> =	No counter	Castell lock
<b>R</b> =	No counter	Ronis lock
<b>S</b> =	No counter	CES lock
<b>A</b> =	Counter	No lock
<b>Y</b> =	Counter	Kirk lock
<b>L</b> =	Counter	Castell lock
<b>H</b> =	Counter	Ronis lock indicator
<b>E</b> =	Counter	CES lock

**Latch Check Switch/Trip Unit Metering Voltage Connection for Digitrip 1150 Trip Unit**

	Latch Check Switch	1150 Voltage Connection
<b>N</b> =	None	Upper terminals
<b>M</b> =	None	Lower terminals
<b>L</b> =	LCS wired to SRD	Upper terminals
<b>Y</b> =	LCS Wired to SRD	Lower terminals
<b>C</b> =	LCS Wired External	Upper terminals
<b>D</b> =	LCS Wired External	Lower terminals

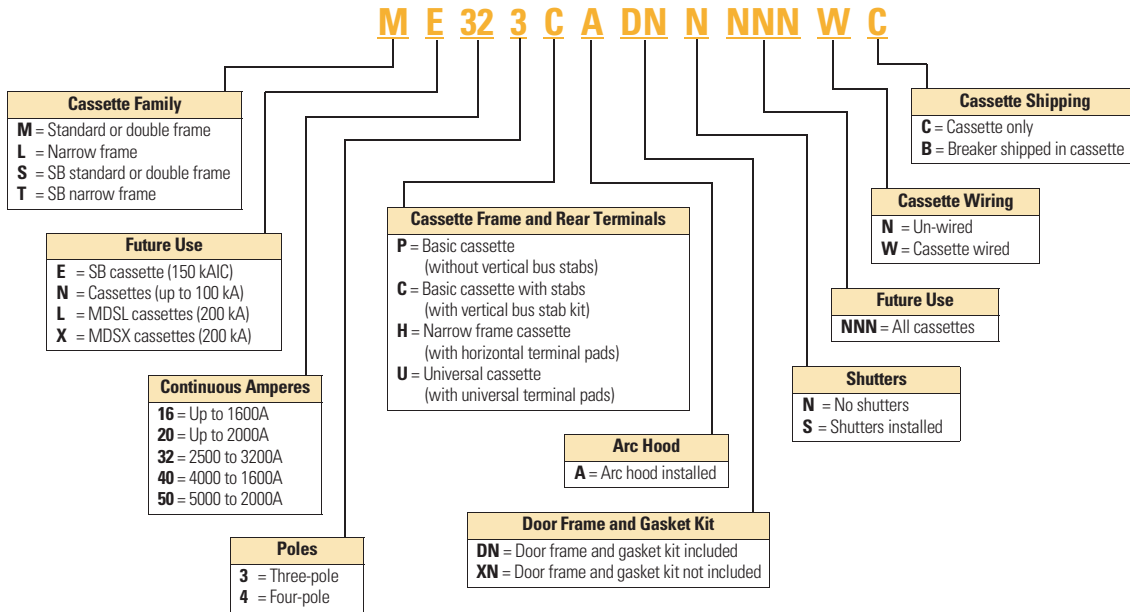
**Breaker Shipping Options and Instructions**

**A** = Fixed breaker alone with door kit  
**F** = Fixed breaker alone without door kit  
**A** = Drawout breaker alone without door frame kit  
**C** = Drawout breaker in cassette (un-wired)  
**P** = Drawout breaker in cassette (shutters)  
**S** = Drawout breaker in cassette (shutters)  
**W** = Drawout breaker in cassette (pre-wired and shutters)  
 Double frame drawout breakers ship without cassette drawout. ACBs ship in narrow and universal cassettes only.

**Frame Use**

**X** = All breakers

### Cassette Magnum DS ANSI Breaker Product Family



# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### Technical Data and Specifications

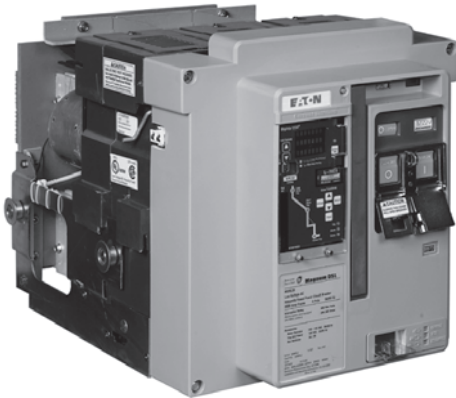
#### Magnum DS Switchgear Class UL 1066 Low Voltage Power Circuit Breakers

Frame Amperes	Breaker Type Catalog Position 1–6	Frame Type	rms Symmetrical Current Ratings kA 50/60 Hz <sup>①</sup>				Short-Time Withstand Rating	Fixed Internal Instantaneous Trip	Available Current Sensor and Rating Plugs for Digitrip RMS Trip Unit (Establishes Breaker I <sub>n</sub> Rating)
			Interrupting at 254 Vac	Interrupting at 508 Vac	Interrupting at 635 Vac	Interrupting at 635 Vac			
800	MDN-408	Narrow	42	42	42	42	—	200, 250, 300, 400, 600, 800	
	MDN-508	Narrow	50	50	50	50	—		
	MDN-608	Narrow	65	65	65	65	—		
	MDN-C08	Narrow	100	100	65	20	18 x I <sub>n</sub>		
	MDS-408	Standard	42	42	42	42	—		
	MDS-608	Standard	65	65	65	65	—		
	MDS-808	Standard	85	85	85	85	—		
	MDS-C08	Standard	100	100	100	85	85		
	MDS-L08 <sup>②</sup>	Standard	200	200	200	—	—		
	MDS-X08 <sup>③</sup>	Standard	200	200	④	30	30		
1600	MDN-416	Narrow	42	42	42	42	—	200, 250, 300, 400, 600, 800, 1000, 1200, 1600	
	MDN-516	Narrow	50	50	50	50	—		
	MDN-616	Narrow	65	65	65	65	—		
	MDN-C16	Narrow	100	100	65	30	18 x I <sub>n</sub>		
	MDS-616	Standard	65	65	65	65	—		
	MDS-816	Standard	85	85	85	85	—		
	MDS-C16	Standard	100	100	100	85	85		
	MDS-L16 <sup>②</sup>	Standard	200	200	200	—	—		
	MDS-X16 <sup>③</sup>	Standard	200	200	④	30	30		
	2000	MDN-620	Narrow	65	65	65	65		—
MDN-C20		Narrow	100	100	65	35	18 x I <sub>n</sub>		
MDS-620		Standard	65	65	65	65	—		
MDS-820		Standard	85	85	85	85	—		
MDS-C20		Standard	100	100	100	85	85		
MDS-L20 <sup>②</sup>		Standard	200	200	200	—	—		
MDS-X20 <sup>③</sup>		Standard	200	200	④	30	30		
3200	MDS-632	Standard	65	65	65	65	—	200, 250, 300, 400, 600, 800, 1000, 1200, 1600, 2000, 2500, 3000, 3200	
	MDS-832	Standard	85	85	85	85	—		
	MDS-C32	Standard	100	100	100	85	85		
	MDS-X32 <sup>③</sup>	Double	200	200	④	50	50		
4000	MDN-640	Double narrow	65	65	65	65	—	2000, 2500, 3200, 4000	
	MDN-840	Double narrow	85	85	65	85	—		
	MDN-C40	Double narrow	100	100	65	100	—		
	MDS-840	Double	85	85	85	85	—		
	MDS-C40	Double	100	100	100	100	—		
	MDS-X40 <sup>③</sup>	Double	200	200	④	50	50		
	MDD-X40	Double	200	200	100	100	—		
5000	MDS-850	Double	85	85	85	85	—	2500, 3200, 4000, 5000	
	MDS-C50	Double	100	100	100	100	—		
	MDS-X50 <sup>③⑤</sup>	Double	200	200	④	50	50		
	MDD-X50	Double	200	200	100	100	—		
6000	MDS-C60 <sup>⑤</sup>	Double	100	100	100	100	—	3200, 4000, 5000, 6000	
	MDD-X60 <sup>⑤</sup>	Double	200	200	100	100	—		

#### Notes

- ① Interrupting ratings shown based on breaker equipped with integral Digitrip RMS Trip Unit. Interruption ratings for non-automatic breakers are equal to the published short-time withstand rating. These interruption ratings are based on the standard duty cycle consisting of an open operation, a 15-second interval and a close-open operation, in succession, with delayed tripping in case of short-delay devices. The standard duty cycle for short-time ratings consists of maintaining the rated current for two periods of 1/2 seconds each, with a 15-second interval of zero current between the two periods.
- ② Magnum MDSL Current Limiting Power Circuit Breaker With Integral Current Limiters. Current Limiter selected determines short-time and fixed instantaneous trip rating. Maximum voltage rating is 600 Vac.
- ③ Magnum MDSX Current Limiting Power Circuit Breaker with fast opening contacts.
- ④ Product to be tested. Contact Eaton for product rating.
- ⑤ Breaker applied in a tested fan-cooled enclosure.

**Magnum MDSL Current Limiting Power Circuit Breaker**



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Medium Voltage Circuit Breakers . . . . .	<b>V4-T3-34</b>

**Magnum MDSL Current Limiting Power Circuit Breaker**

**Product Description**

The following curves illustrate the ratings, melting time-current characteristics and current limiting, or let-through characteristics, of limiters for Magnum Low Voltage Power Circuit Breakers.

The let-through current for a given limiter application is readily determined by extending a vertical line from the applicable maximum available symmetrical fault amperes at the bottom margin to the characteristic line for the particular limiter, and from this intersection extending a horizontal line to the left margin and reading the peak current. The withstand rating of any circuit elements protected by the limiters should be at least equal to this peak current.

It will be noted that the let-through current increases with the limiter size or ampere rating; in other words, the maximum current limiting effect is obtained with the smallest size. This effect is to be expected, since the resistance decreases as the rating increases. If the vertical line from the bottom margin as described in the previous paragraph does not intersect the limiter characteristic line,

the available system fault current is below the "threshold" current of that limiter, and it will offer no current limiting effect.

The current limiting principle is illustrated below:

$I_a$ = The Available Peak Fault Current

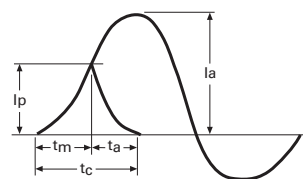
$t_m$ =The Melting Time

$I_p$ = The Peak Let-Through Current

$t_a$ = The Arcing Time

$t_c$ = The Total Interrupting (Clearing)Time

**Current Limiting**



**Limiter Selection**

The selection of a suitable limiter rating for a given application is generally governed by a choice of the following types of protection:

- A. Maximum protection of "downstream" components. Type MDSL breakers are often used for this purpose even when the maximum available fault currents are within the interrupting rating of the corresponding unfused Magnum breakers.
- B. Protection of the circuit breaker only.

Case A would tend to use the smallest available limiter; Case B the largest. When downstream protection is required, the selection is usually a compromise, since certain small limiters cannot be coordinated with the breaker to avoid nuisance blowing on overloads or small and moderate short circuits.

Minimum, recommended and maximum limiter sizes for Magnum MDSL breakers are given in the table on **Page V4-T3-12.**

# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### Product Selection

##### Magnum MDSL Sensor/Rating Plug vs. Current Limiter Selection <sup>①</sup>

Sensor and Rating Plug I<sub>n</sub> MDSL Current Limiter Selection Chart <sup>②</sup>

Sensor and Rating Plug I <sub>n</sub>	MA250	MA300	MA400	MA600 <sup>③</sup>	MA800	MB1200	MB1600	MB2000	MD2500	MD3000
200										
250			MA400	MA600	MA800 <sup>③</sup>	MB1200	MB1600	MB2000	MD2500	MD3000
300			MA400	MA600	MA800 <sup>③</sup>	MB1200	MB1600	MB2000	MD2500	MD3000
400				MA600	MA800	MB1200 <sup>③</sup>	MB1600	MB2000	MD2500	MD3000
600					MA800	MB1200	MB1600	MB2000 <sup>③</sup>	MD2500	MD3000
800						MB1200	MB1600	MB2000	MD2500 <sup>③</sup>	MD3000
1000							MB1600	MB2000	MD2500 <sup>③</sup>	MD3000
1200								MB2000	MD2500 <sup>③</sup>	MD3000
1600										MD3000 <sup>③</sup>
2000										MD3000 <sup>③</sup>

#### Technical Data and Specifications

##### Magnum MDSL Ratings

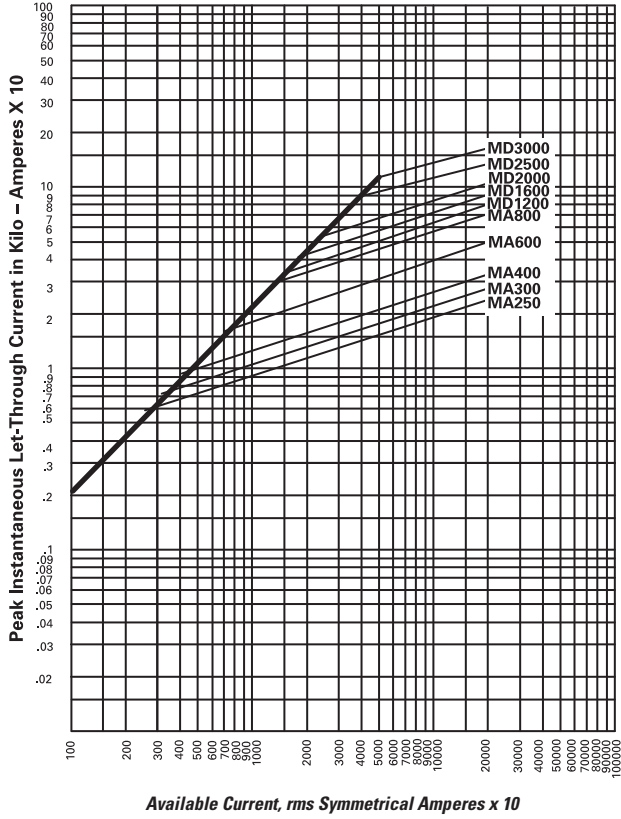
Frame	Catalog Number	Available Sensor/Rating Plug (Amperes)
800	MDSL08	200, 250, 300, 400, 600, 800
1600	MDSL16	200, 250, 300, 400, 600, 800, 1000, 1200, 1600
2000	MDSC20	1600, 2000

##### Notes

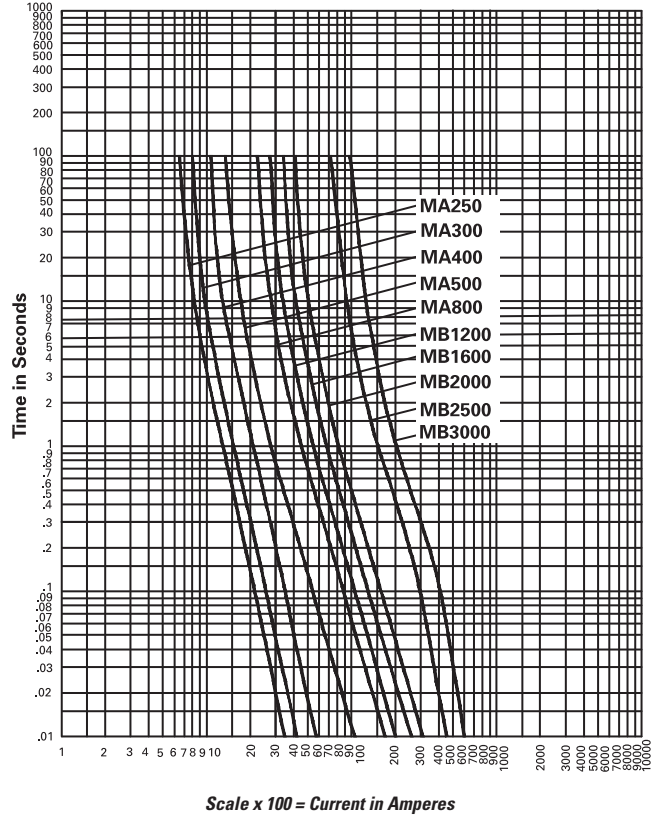
- ① Select the current limiter based on the Magnum breaker frame and current sensor and rating plug as shown.
- ② Refer to MDSL current limiter curves for let-through and time characteristics.
- ③ The recommended ratings shown as shaded provide for reduced current let-through and breaker coordination within the trip unit settings. Selection of current limiters below the recommended ratings shown provides lower current let-through, however, trip unit settings must be considered to avoid nuisance operation.

**Trip Curve Charts**

**Type Magnum DSL Limiters, Peak Let-Through Current Characteristics**



**Type Magnum DSL Limiters Average Melting Time-Current Characteristics**



**Note**

For Time/Current Curves, see [www.eaton.com/electrical](http://www.eaton.com/electrical)

# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

Magnum SB Low Voltage Insulated Case Circuit Breaker



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### Magnum SB Low Voltage Insulated Case Circuit Breakers

#### Product Description

Magnum SB is a Low Voltage Insulated Case Circuit breaker family designed for the performance and economic requirements of UL 891 switchboards.

- Magnum SB Insulated Case Circuit Breakers have interrupting ratings up to 100 kA at 635 Vac with continuous current ratings up to 5000A
- Magnum SB Insulated Case Circuit Breakers have lighter-duty short-time withstand ratings and fixed internal instantaneous trips on most ratings, which is characteristic of UL 489 molded case breakers commonly used in UL 891 switchboards. This provides for greater economy and excellent coordination and selectivity for most commercial applications
- Fixed internal instantaneous trips will be phased in on all SB Insulated Case Circuit Breakers rated 3200A and below to provide an extra safety factor by reducing the energy let-through to

downstream circuits at the maximum instantaneous trip point and to facilitate feeder circuit breaker protection in UL 891 switchboards with 3-cycle bus bracing

- Magnum SBSE Current Limiting Power Circuit Breakers have 150 kA interrupting ratings at 480 Vac with continuous current ratings up to 5000A. The short-time withstand rating is 30 kA for standard frame and 50 kA for double frame breakers

Magnum SB			
SBNC16 Insulated Case			
Low Voltage AC Power Circuit Breaker			
1600 Amp Frame 4 Pole 50/60 Hz			
Interruption Ratings in Amps			
Max Volts	Inst Trip	Short Delay	
635	65,000A	30,000A	
508	100,000A	30,000A	
254	100,000A	30,000A	
Accessories			
Motor Operator	110 - 125 VAC 50/60 Hz		
OTS/Bell Alarm			
Trip Unit Power	120 VAC 50/60 Hz		
Aux Switches	4A / 4B		
Spring Release Latch Check Switch			
G.O.P.: SAMPLE	It: 001	Seq: 002	
Case P.D.: SAMPLE	Code:		
02/18/05	18:19:53		
CAT#: SBNC164XA 16MJA NAARY MYLAX			
Enclosure Requirements Dwg: 2C13090			
Installation and Operating Instructions: I.B. 2C12060			
Made in USA			

Typical Magnum SB Low Voltage Insulated Case Circuit Breaker Nameplate

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Medium Voltage Circuit Breakers . . . . .	V4-T3-34

### Standards and Certifications

#### UL and ANSI Test Certifications

Magnum SB meets or exceeds the applicable ANSI, NEMA, UL and CSA standards, including:

- ANSI C37.13 (Low Voltage AC Power Circuit Breakers Used in Enclosures)
- ANSI C37.16 (Preferred Ratings, Related Requirements, and Application Recommendations for Low Voltage Power Circuit Breakers and AC Power Circuit Breakers)
- ANSI C37.17 (Trip Devices for AC and General Purpose DC Low Voltage Power Circuit Breakers)
- ANSI C37.50 (Test Procedures for Low Voltage AC Power Circuit Breakers Used in Enclosures)
- UL 1066 (Standard for Low Voltage AC and DC Power Circuit Breakers Used in Enclosures)
- NEMA SG3 (This standard adopts ANSI C37.16 in its entirety)

#### Comprehensive Enclosure Solutions

Magnum DS has proven performance in Eaton manufactured switchgear and switchboards with the following test certifications:

- UL 1558 (Certified Magnum DS Low Voltage Metal-Enclosed switchgear)
- UL 891 (Certified Pow-R-Line C Low Voltage Switchboards)
- UL, CSA 22.2.31 Low Voltage Assemblies

#### Approvals and Marks

UL listed: Magnum DS Breaker UL File E52096 and Cassette UL File E204565



#### Product Selection

Contact Eaton for pricing.

Technical Data and Specifications

Magnum SB Switchboard Class Insulated Case Low Voltage Air Circuit Breakers

Frame Amperes	Breaker Type Catalog Position 1-6	Frame Type	rms Symmetrical Current Ratings kA 50/60 Hz ①				Short-Time Withstand Rating	Fixed Internal Instantaneous Trip	Available Current Sensor and Rating Plugs for Digitrip RMS Trip Unit (Establishes Breaker I <sub>n</sub> Rating)
			Interrupting at 254 Vac	Interrupting at 508 Vac	Interrupting at 635 Vac				
800	SBN-508	Narrow	50	50	35	20	②	200, 250, 300, 400, 600, 800	
	SBN-608	Narrow	65	65	42	20	②		
	SBN-C08	Narrow	100	100	65	20	18 x I <sub>n</sub>		
	SBS-608	Standard	65	65	65	20	②		
	SBS-C08	Standard	100	100	85	20	②		
	SBS-E08 ④	Standard	200	150	③	30	30		
1200	SBN-512	Narrow	50	50	35	25	②	200, 250, 300, 400, 600, 800, 1000, 1200	
	SBN-612	Narrow	65	65	42	25	②		
	SBN-C12	Narrow	100	100	65	25	18 x I <sub>n</sub>		
	SBS-612	Standard	65	65	65	25	②		
	SBS-C12	Standard	100	100	85	25	②		
	SBS-E12 ④	Standard	200	150	③	30	30		
1600	SBN-516	Narrow	50	50	35	30	②	200, 250, 300, 400, 600, 800, 1000, 1200, 1600	
	SBN-616	Narrow	65	65	42	30	②		
	SBN-C16	Narrow	100	100	65	30	18 x I <sub>n</sub>		
	SBS-616	Standard	65	65	65	30	②		
	SBS-C16	Standard	100	100	85	30	②		
	SBS-E16 ④	Standard	200	150	③	30	30		
2000	SBN-620	Narrow	65	65	65	35	②	200, 250, 300, 400, 600, 800, 1000, 1200, 1600, 2000	
	SBN-C20	Narrow	100	100	65	35	18 x I <sub>n</sub>		
	SBS-620	Standard	65	65	65	35	②		
	SBS-C20	Standard	100	100	85	35	②		
	SBS-E20 ④	Standard	200	150	③	30	30		
2500	SBS-625	Standard	65	65	65	45	②	200, 250, 300, 400, 600, 800, 1000, 1200, 1600, 2000, 2500	
	SBS-C25	Standard	100	100	85	45	②		
	SBS-E25 ④	Double	200	150	③	50	50		
3000	SBS-630	Standard	65	65	65	50	②	200, 250, 300, 400, 600, 800, 1000, 1200, 1600, 2000, 2500, 3000	
	SBS-C30	Standard	100	100	85	50	②		
	SBS-E30 ④	Double	200	150	③	50	50		
4000	SBS-840	Double	85	85	85	85	—	2000, 2500, 3000, 4000	
	SBS-C40	Double	100	100	100	100	—		
	SBS-E40 ④	Double	200	150	③	50	50		
5000	SBS-850	Double	85	85	85	85	—	2500, 3000, 4000, 5000	
	SBS-C50	Double	100	100	100	100	—		
	SBS-E50 ④⑤	Double	200	150	③	50	50		
6000	SBS-C60 ⑤	Double	100	100	100	100	—	3000, 4000, 5000, 6000	

Notes

① Interrupting ratings shown based on breaker equipped with integral Digitrip RMS Trip Unit. Interruption ratings for non-automatic breakers are equal to the published short-time withstand rating. These interruption ratings are based on the standard duty cycle consisting of an open operation, a 15-second interval and a close-open operation, in succession, with delayed tripping in case of short-delay devices. The standard duty cycle for short-time ratings consists of maintaining the rated current for two periods of 1/2 seconds each, with a 15-second interval of zero current between the two periods.

② Fixed internal instantaneous trip set at approximately 18 x I<sub>n</sub>, symmetrical will be phased into the product.

③ Product to be tested. Contact Eaton for product rating.

④ Magnum SBSSE Current Limiting Power Circuit Breaker with fast opening contacts.

⑤ Breaker applied in a tested fan-cooled enclosure.

Magnum SB is UL 1066 listed.



# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

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#### Digitrip Trip Units for Magnum SB and Magnum DS ANSI/UL Rated Power Circuit Breakers



Trip Unit Type		Digitrip 520	Digitrip 520M	Digitrip 520MC	Digitrip 1150+ ①
Ampere range		200–6000A	200–6000A	200–6000A	200–6000A
Interrupting rating at 480V		42–200 kA	42–200 kA	42–200 kA	42–200 kA
rms sensing		Yes	Yes	Yes	Yes
<b>Protection and Coordination</b>					
Protection	Ordering options	LI, LSI, LSIG	LSI, LSIG, LSIA	LSI, LSIG, LSIA	LSI, LSIG, LSIA
	Fixed rating plug ( $I_n$ )	Yes	Yes	Yes	Yes
	Overtemperature trip	Yes	Yes	Yes	Yes
Long delay protection (L)	Long delay pickup	0.4–1.0 x ( $I_n$ )	0.4–1.0 x ( $I_n$ )	0.4–1.0 x ( $I_n$ )	0.4–1.0 x ( $I_n$ )
	Long delay time $I^2t$ at 6 x $I_r$	2–24 sec	2–24 sec	2–24 sec	2–24 sec
	Long delay time $I^4t$	No	No	No	1–5 sec
	IEEE curves	No	No	No	Yes
	Long delay thermal memory	Yes	Yes	Yes	Yes
	High load alarm	No	No	No	0.5–1.0 x ( $I_r$ )
Short delay protection (S)	Short delay pickup	200–1000% x ( $I_r$ ) and M1	200–1000% x ( $I_r$ ) and M1	200–1000% x ( $I_r$ ) and M1	200–1000% x ( $I_r$ ) and M1
	Short delay time $I^2t$ at 8 x $I_r$	100–500 ms	100–500 ms	100–500 ms	100–500 ms
	Short delay time flat	100–500 ms	100–500 ms	100–500 ms	100–500 ms
	Short delay time ZSI	Yes	Yes	Yes	Yes
Instantaneous protection (I)	Instantaneous pickup	200–1000% x ( $I_n$ ) and M1	200–1000% x ( $I_n$ ) and M1	200–1000% x ( $I_n$ ) and M1	200–1000% x ( $I_n$ ) and M1
	Making current release	Yes	Yes	Yes	Yes
	Off position	LSI and LSIG	Yes	Yes	Yes
Ground fault protection (G) ②	Ground fault alarm	No	Yes	Yes	Yes
	Ground fault pickup	25–100% x ( $I_n$ )	25–100% x ( $I_n$ )	25–100% x ( $I_n$ )	24–100% x ( $I_n$ )
	Ground fault delay $I^2t$ at 0.625 x $I_n$	100–500 ms	100–500 ms	100–500 ms	100–500 ms
Disable ground fault protection		No	No	No	No
Neutral protection (N)		Model LSI	Model LSI	Model LSI	Model LSI
<b>System Diagnostics</b>					
Cause of trip LEDs		Yes	Yes	Yes	Yes
Magnitude of trip information		No	Yes	Yes	Yes
Remote signal contacts		No	Yes	Yes	Yes
Programmable contacts		No	No	No	Yes
Electronic operations counter		No	No	No	Yes

#### Notes

① Over and undervoltage alarm or trip, over and underfrequency alarm or trip, voltage unbalance alarm or trip, reverse power trip and phase rotation alarm are included.

② 1200A maximum ground fault setting per UL/NEC.

$I_n$  = Rating plug and sensor rating.

$I_r$  = Long delay pickup setting.

Digitrip Trip Units for Magnum SB ANSI/UL Rated Power Circuit Breakers, continued



Digitrip 520



Digitrip 520M



Digitrip 520MC



Digitrip 1150+ ①

Trip Unit Type	Digitrip 520	Digitrip 520M	Digitrip 520MC	Digitrip 1150+ ①
<b>System Monitoring</b>				
Digital display	No	4-Character LCD	4-Character LCD	24-Character LED
Current (%) full scale sensor	No	Yes +/- 2%	Yes +/- 2%	Yes +/- 1%
Voltage (%) L to L	No	No	No	Yes +/- 1%
Power and energy (%)	No	No	No	Yes +/- 2%
Apparent power kVA and demand	No	No	No	Yes
Reactive power kVAR	No	No	No	Yes
Power factor	No	No	No	Yes
Crest factor	No	No	No	Yes
<b>System Communications</b>				
Type	—	—	INCOM/PowerNet/Modbus ②/ PROFIBUS ②	INCOM/PowerNet/TripLink/ Modbus ②/PROFIBUS ②
Power supply in breaker	N/A	Optional	Standard	Standard
<b>Additional Features</b>				
Trip log (three events)	No	No	No	Yes
Electronic operations counter	No	No	No	Yes
Testing method ③	Test set	Test set	Test set	Integral and test set
Waveform capture	No	No	No	Yes
ARMs (Arcflash Reduction Maintenance System Mode)	No	No	Yes	Yes ④
Breaker health monitor	No	No	No	Yes
Programmable relay functions	No	No	No	Yes ①

**Notes**

① Over and undervoltage alarm or trip, over and underfrequency alarm or trip, voltage unbalance alarm or trip, reverse power trip and phase rotation alarm are included.

② Requires externally mounted MMINT or PMINT module.

③ Test set for secondary injection.

④ Contact Eaton for availability.

$I_n$  = Rating plug and sensor rating.

$I_r$  = Long delay pickup setting.

Magnum Double Narrow Frame Drawout Air Circuit Breaker With Cassette



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### Magnum IEC Rated Air Circuit Breakers

#### Product Description

Magnum Air Circuit Breakers are designed to enable global power distribution solutions in IEC switchboards and other custom enclosures.

- Magnum IEC Air Circuit Breakers have interrupting ratings up to 100 kA at 690 Vac with continuous current ratings up to 6300A
- Magnum IEC Air Circuit Breaker continuous current frames are 100% rated. No thermal de-rating is required when applying the breaker in the low voltage systems enclosure at ambient temperatures of 104°F (40°C)
- Magnum IEC Breakers carry the KEMA Keur Mark, which requires periodic follow-up testing, witnessed by KEMA, to demonstrate our product performs to its published nameplate ratings. This differentiates Magnum Air Circuit Breakers from the competition, where in general, self-certification testing is performed on products when initially introduced with no binding commitments to perform subsequent follow-up third-party testing.

#### Standards and Certifications

##### IEC Test Certifications

Magnum Air Circuit Breakers meet or exceed the applicable IEC standards, including:

- EN/IEC 60947-2
- KEMA third-party witness and follow-up testing

##### Comprehensive Enclosure Solutions

Magnum Air Circuit Breakers have proven performance in IEC switchboards and custom enclosures manufactured by Eaton and Low Voltage Systems Builders (OEMs) to the following standards:

- EN/IEC 60947-1
- EN/IEC 60439-1
- Eaton manufactured IEC Low Voltage Switchboard solutions include:
  - Eaton MEM M-Form (UK) Low Voltage Switchboards
  - Eaton Holec® Capitole 40 and Capitole 20 (Holland) Low Voltage Switchboards

- Eaton Tabula Low Voltage Switchboard Systems (global) for Low Voltage Systems Builders
- Eaton Elatis (Germany) Low Voltage Switchboards
- Eaton Xenergy and Modan switchboard systems (global) for low voltage systems builders
- American Bureau of Shipping (ABS)
- Det Norske Veritas (DNV)
- Lloyds of London
- South African Bureau of Standards (SABS)
- For a complete and comprehensive listing of all low voltage power breakers, please visit [www.eaton.com](http://www.eaton.com)



#### Approvals and Marks

Magnum Air Circuit Breakers carry the following approvals and approval marks:

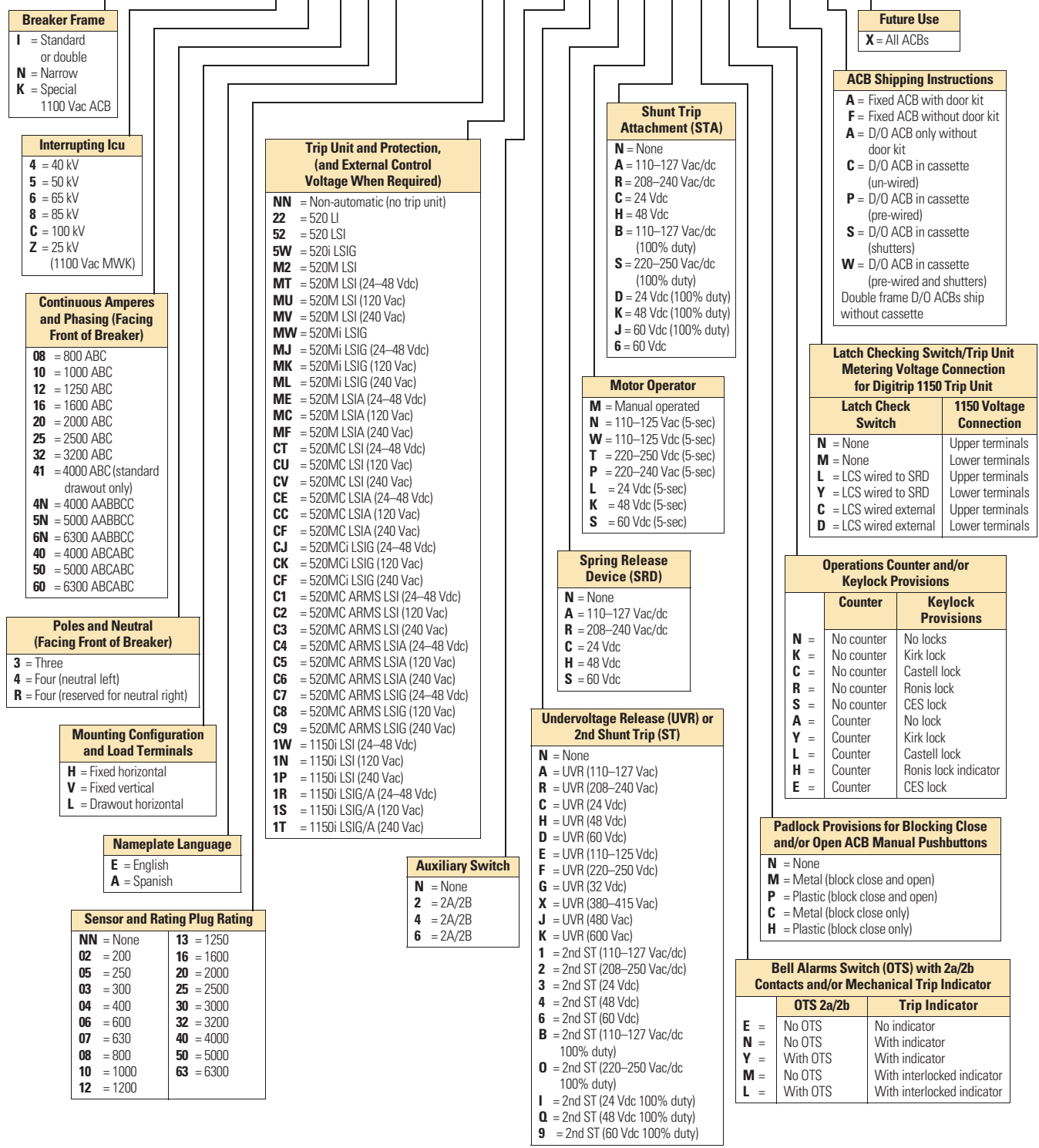
- CE
- KEMA Keur mark
- ABS (American Bureau of Shipping) Type Listed Certificate Number 04-HS422844B-PDA-DUB
- CCC (Certificate for China Compulsory Product Certification) to GB14048.2-2001, Certificate Numbers:
  - 2005010307139381
  - 2003010307094561
  - 2003010307094558

**Note:** The KEMA Keur Mark on the Magnum ACB Label Confirms Third-Party Witness and Follow-up Testing

Catalog Number Selection

Magnum IEC Breaker Product Family ①

MW N 5 12 4 V E A - 03 MT 4 F C L R Y C T M W X



**Breaker Frame**  
**I** = Standard or double  
**N** = Narrow  
**K** = Special  
 1100 Vac ACB

**Interrupting Icu**  
**4** = 40 kV  
**5** = 50 kV  
**6** = 65 kV  
**8** = 85 kV  
**C** = 100 kV  
**Z** = 25 kV  
 (1100 Vac MWK)

**Continuous Amperes and Phasing (Facing Front of Breaker)**  
**08** = 800 ABC  
**10** = 1000 ABC  
**12** = 1250 ABC  
**16** = 1600 ABC  
**20** = 2000 ABC  
**25** = 2500 ABC  
**32** = 3200 ABC  
**41** = 4000 ABC (standard drawout only)  
**4N** = 4000 AABBC  
**5N** = 5000 AABBC  
**6N** = 6300 AABBC  
**40** = 4000 ABCABC  
**50** = 5000 ABCABC  
**60** = 6300 ABCABC

**Poles and Neutral (Facing Front of Breaker)**  
**3** = Three  
**4** = Four (neutral left)  
**R** = Four (reserved for neutral right)

**Mounting Configuration and Load Terminals**  
**H** = Fixed horizontal  
**V** = Fixed vertical  
**L** = Drawout horizontal

**Nameplate Language**  
**E** = English  
**A** = Spanish

**Sensor and Rating Plug Rating**

<b>NN</b> = None	<b>13</b> = 1250
<b>02</b> = 200	<b>16</b> = 1600
<b>05</b> = 250	<b>20</b> = 2000
<b>03</b> = 300	<b>25</b> = 2500
<b>04</b> = 400	<b>30</b> = 3000
<b>06</b> = 600	<b>32</b> = 3200
<b>07</b> = 630	<b>40</b> = 4000
<b>08</b> = 800	<b>50</b> = 5000
<b>10</b> = 1000	<b>63</b> = 6300
<b>12</b> = 1200	

**Trip Unit and Protection, (and External Control Voltage When Required)**

**NN** = Non-automatic (no trip unit)  
**22** = 520 LI  
**52** = 520 LSI  
**5W** = 520i LSIG  
**M2** = 520M LSI  
**MT** = 520M LSI (24–48 Vdc)  
**MU** = 520M LSI (120 Vac)  
**MV** = 520M LSI (240 Vac)  
**MW** = 520Mi LSIG  
**MJ** = 520Mi LSIG (24–48 Vdc)  
**MK** = 520Mi LSIG (120 Vac)  
**ML** = 520Mi LSIG (240 Vac)  
**ME** = 520M LSI (24–48 Vdc)  
**MC** = 520M LSI (120 Vac)  
**MF** = 520M LSI (240 Vac)  
**CT** = 520MC LSI (24–48 Vdc)  
**CU** = 520MC LSI (120 Vac)  
**CV** = 520MC LSI (240 Vac)  
**CE** = 520MC LSI (24–48 Vdc)  
**CC** = 520MC LSI (120 Vac)  
**CF** = 520MC LSI (240 Vac)  
**CJ** = 520MCi LSI (24–48 Vdc)  
**CK** = 520MCi LSI (120 Vac)  
**CF** = 520MCi LSI (240 Vac)  
**C1** = 520MC ARMS LSI (24–48 Vdc)  
**C2** = 520MC ARMS LSI (120 Vac)  
**C3** = 520MC ARMS LSI (240 Vac)  
**C4** = 520MC ARMS LSI (24–48 Vdc)  
**C5** = 520MC ARMS LSI (120 Vac)  
**C6** = 520MC ARMS LSI (240 Vac)  
**C7** = 520MC ARMS LSI (24–48 Vdc)  
**C8** = 520MC ARMS LSI (120 Vac)  
**C9** = 520MC ARMS LSI (240 Vac)  
**1W** = 1150i LSI (24–48 Vdc)  
**1N** = 1150i LSI (120 Vac)  
**1P** = 1150i LSI (240 Vac)  
**1R** = 1150i LSI/A (24–48 Vdc)  
**1S** = 1150i LSI/A (120 Vac)  
**1T** = 1150i LSI/A (240 Vac)

**Auxiliary Switch**  
**N** = None  
**2** = 2A/2B  
**4** = 2A/2B  
**6** = 2A/2B

**Shunt Trip Attachment (STA)**  
**N** = None  
**A** = 110–127 Vac/dc  
**R** = 208–240 Vac/dc  
**C** = 24 Vdc  
**H** = 48 Vdc  
**B** = 110–127 Vac/dc (100% duty)  
**S** = 220–250 Vac/dc (100% duty)  
**D** = 24 Vdc (100% duty)  
**K** = 48 Vdc (100% duty)  
**J** = 60 Vdc (100% duty)  
**6** = 60 Vdc

**Motor Operator**  
**M** = Manual operated  
**N** = 110–125 Vac (5-sec)  
**W** = 110–125 Vdc (5-sec)  
**T** = 220–250 Vdc (5-sec)  
**P** = 220–240 Vac (5-sec)  
**L** = 24 Vdc (5-sec)  
**K** = 48 Vdc (5-sec)  
**S** = 60 Vdc (5-sec)

**Spring Release Device (SRD)**  
**N** = None  
**A** = 110–127 Vac/dc  
**R** = 208–240 Vac/dc  
**C** = 24 Vdc  
**H** = 48 Vdc  
**S** = 60 Vdc

**Undervoltage Release (UVR) or 2nd Shunt Trip (ST)**

**N** = None  
**A** = UVR (110–127 Vac)  
**R** = UVR (208–240 Vac)  
**C** = UVR (24 Vdc)  
**H** = UVR (48 Vdc)  
**D** = UVR (60 Vdc)  
**E** = UVR (110–125 Vdc)  
**F** = UVR (220–250 Vdc)  
**G** = UVR (32 Vdc)  
**X** = UVR (380–415 Vac)  
**J** = UVR (480 Vac)  
**K** = UVR (600 Vac)  
**1** = 2nd ST (110–127 Vac/dc)  
**2** = 2nd ST (208–250 Vac/dc)  
**3** = 2nd ST (24 Vdc)  
**4** = 2nd ST (48 Vdc)  
**6** = 2nd ST (60 Vdc)  
**B** = 2nd ST (110–127 Vac/dc 100% duty)  
**O** = 2nd ST (220–250 Vac/dc 100% duty)  
**I** = 2nd ST (24 Vdc 100% duty)  
**Q** = 2nd ST (48 Vdc 100% duty)  
**9** = 2nd ST (60 Vdc 100% duty)

**Future Use**  
**X** = All ACBs

**ACB Shipping Instructions**  
**A** = Fixed ACB with door kit  
**F** = Fixed ACB without door kit  
**A** = D/O ACB only without door kit  
**C** = D/O ACB in cassette (un-wired)  
**P** = D/O ACB in cassette (pre-wired)  
**S** = D/O ACB in cassette (shutters)  
**W** = D/O ACB in cassette (pre-wired and shutters)  
 Double frame D/O ACBs ship without cassette

**Latch Checking Switch/Trip Unit Metering Voltage Connection for Digitrip 1150 Trip Unit**

Latch Check Switch	1150 Voltage Connection
<b>N</b> = None	Upper terminals
<b>M</b> = None	Lower terminals
<b>L</b> = LCS wired to SRD	Upper terminals
<b>Y</b> = LCS wired to SRD	Lower terminals
<b>C</b> = LCS wired external	Upper terminals
<b>D</b> = LCS wired external	Lower terminals

**Operations Counter and/or Keylock Provisions**

	Counter	Keylock Provisions
<b>N</b> =	No counter	No locks
<b>K</b> =	No counter	Kirk lock
<b>C</b> =	No counter	Castell lock
<b>R</b> =	No counter	Ronis lock
<b>S</b> =	No counter	CES lock
<b>A</b> =	Counter	No lock
<b>Y</b> =	Counter	Kirk lock
<b>L</b> =	Counter	Castell lock
<b>H</b> =	Counter	Ronis lock indicator
<b>E</b> =	Counter	CES lock

**Padlock Provisions for Blocking Close and/or Open ACB Manual Pushbuttons**

**N** = None  
**M** = Metal (block close and open)  
**P** = Plastic (block close and open)  
**C** = Metal (block close only)  
**H** = Plastic (block close only)

**Bell Alarms Switch (OTS) with 2a/2b Contacts and/or Mechanical Trip Indicator**

	OTS 2a/2b	Trip Indicator
<b>E</b> =	No OTS	No indicator
<b>N</b> =	No OTS	With indicator
<b>Y</b> =	With OTS	With indicator
<b>M</b> =	No OTS	With interlocked indicator
<b>L</b> =	With OTS	With interlocked indicator

Note

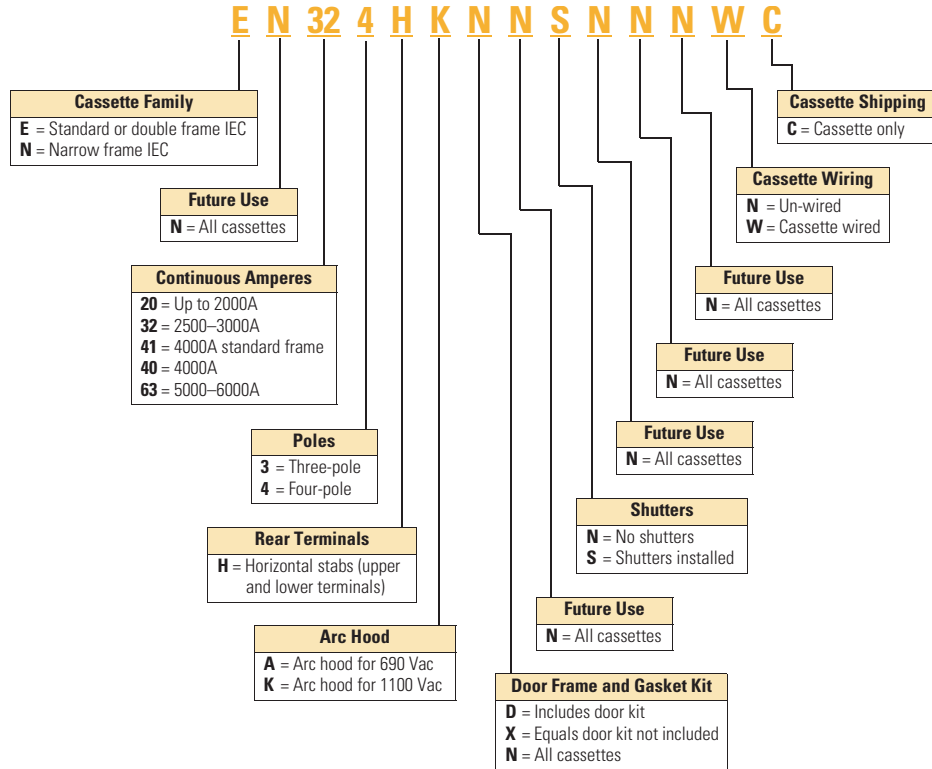
① Exclusionary rules apply. Refer to price list. Confirm all final part numbers with Eaton. Format structure subject to modifications and additions without notice.

# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### Cassette Magnum IEC Breaker Product Family ①



**Note**

① Exclusionary rules apply. Refer to price list. Confirm all final part numbers with Eaton. Format structure subject to modifications and additions without notice.

Technical Data and Specifications

Magnum IEC 60947-2 Rated Air Circuit Breakers

Frame Amperes	Breaker Type Catalog Position 1-6	Frame Type	rms Symmetrical Current Ratings kA ①				Withstand Rating I <sub>cw</sub> 1-Sec / 3-Sec	Fixed Internal Instantaneous Trip	Available Current Sensor and Rating Plugs for Digitrip RMS Trip Unit (Establishes Breaker I <sub>n</sub> Rating)
			Interrupting at 240 Vac I <sub>cu</sub> = I <sub>cs</sub>	Interrupting at 440 Vac I <sub>cu</sub> = I <sub>cs</sub>	Interrupting at 690 Vac I <sub>cu</sub> = I <sub>cs</sub>	Interrupting at 690 Vac I <sub>cu</sub> = I <sub>cs</sub>			
800	MWN-408	Narrow	40	40	40	40/—	—	200, 250, 300, 400, 630, 800	
	MWN-508	Narrow	50	50	50	50/—	—		
	MWN-608	Narrow	65	65	65	65/40	—		
	MWI-608	Standard	65	65	65	65/—	—		
	MWI-808	Standard	85	85	85	85/65	—		
MWI-C08	Standard	100	100	85	85/65	85			
1000	MWN-410	Narrow	40	40	40	40/—	—	200, 250, 300, 400, 630, 800, 1000	
	MWN-510	Narrow	50	50	50	50/—	—		
	MWN-610	Narrow	65	65	65	65/40	—		
	MWI-610	Standard	65	65	65	65/—	—		
	MWI-810	Standard	85	85	85	85/65	—		
MWI-C10	Standard	100	100	85	85/65	85			
1250	MWN-412	Narrow	40	40	40	40/—	—	200, 250, 300, 400, 630, 800, 1000, 1250	
	MWN-512	Narrow	50	50	50	50/—	—		
	MWN-612	Narrow	65	65	65	65/40	—		
	MWI-612	Standard	65	65	65	65/—	—		
	MWI-812	Standard	85	85	85	85/65	—		
MWI-C12	Standard	100	100	85	85/65	85			
1600	MWN-516	Narrow	50	50	50	50/—	—	200, 250, 300, 400, 630, 800, 1000, 1250, 1600	
	MWN-616	Narrow	65	65	65	65/40	—		
	MWI-616	Standard	65	65	65	65/—	—		
	MWI-816	Standard	85	85	85	85/65	—		
	MWI-C16	Standard	100	100	85	85/65	85		
2000	MWN-520	Narrow	50	50	50	50/30	—	200, 250, 300, 400, 630, 800, 1000, 1250, 1600, 2000	
	MWN-620	Narrow	65	65	65	65/40	—		
	MWI-620	Standard	65	65	65	65/50	—		
	MWI-820	Standard	85	85	85	85/65	—		
	MWI-C20	Standard	100	100	85	85/65	85		
2500	MWI-625	Standard	65	65	65	65/—	—	200, 250, 300, 400, 630, 800, 1000, 1250, 1600, 2000, 2500	
	MWI-825	Standard	85	85	85	85/65	—		
	MWI-C25	Standard	100	100	85	85/65	85		
3200	MWI-632	Standard	65	65	65	65/50	—	200, 250, 300, 400, 630, 800, 1000, 1250, 1600, 2000, 2500, 3200	
	MWI-832	Standard	85	85	85	85/65	—		
	MWI-C32	Standard	100	100	85	85/65	85		
4000	MWI-641 ②	Standard	65	65	65	65/50	—	2000, 2500, 3200, 4000	
	MWI-841 ②	Standard	85	85	85	85/65	—		
	MWI-C41 ②	Standard	105	105	85	85/65	—		
	MWN-64N	Double narrow	65	65	65	65/—	—		
	MWN-84N	Double narrow	85	85	65	85/—	—		
	MWN-C4N	Double narrow	100	100	65	100/—	—		
	MWI-64N	Double	65	65	65	65/—	—		
	MWI-84N	Double	85	85	85	85/—	—		
5000	MWI-85N	Double	85	85	85	85/—	—	2500, 3200, 4000, 5000	
	MWI-C5N	Double	100	100	100	100/—	—		
6300	MWI-86N	Double	85	85	85	85/—	—	3200, 4000, 5000, 6300	
	MWI-C6N	Double	100	100	100	100/—	—		

Notes

- ① Interrupting ratings shown based on breaker equipped with integral Digitrip RMS Trip Unit. Interruption ratings for non-automatic breakers are equal to the published breaker I<sub>cu</sub> rating.
- ② Magnum IEC standard frame breakers rated for 4000A continuous current are available in drawout configuration only.

# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### Digitrip Trip Units for Magnum IEC Rated Air Circuit Breakers



Trip Unit Type		Digitrip 520i	Digitrip 520Mi	Digitrip 520MCi	Digitrip 1150i+ <sup>①</sup>
Ampere range		200–6300A	200–6300A	200–6300A	200–6300A
Interrupting rating at 690V		40–100 kA	40–100 kA	40–100 kA	40–100 kA
rms sensing		Yes	Yes	Yes	Yes
<b>Protection and Coordination</b>					
Protection	Ordering options	LI, LSI, LSIG	LSI, LSIG, LSIA	LSI, LSIG, LSIA	LSI, LSIG, LSIA
	Fixed rating plug ( $I_n$ )	Yes	Yes	Yes	Yes
	Overtemperature trip	Yes	Yes	Yes	Yes
Long delay protection (L)	Long delay setting	0.4–1.0 x ( $I_n$ )	0.4–1.0 x ( $I_n$ )	0.4–1.0 x ( $I_n$ )	0.4–1.0 x ( $I_n$ )
	Long delay time $I^2t$ at 6 x $I_r$	2–24 sec	2–24 sec	2–24 sec	2–24 sec
	Long delay time $I^4t$	No	No	No	1–5 sec
	IEC Type A, B, C curves	No	No	No	Yes
	Long delay thermal memory	Yes	Yes	Yes	Yes
	High load alarm	No	No	No	0.7–1.0 x $I_r$
Short delay protection (S)	Short delay pickup	200–1000% x ( $I_r$ ) and M1	200–1000% x ( $I_r$ ) and M1	200–1000% x ( $I_r$ ) and M1	150–1000% x ( $I_r$ ) and M1
	Short delay time $I^2t$ at 8 x $I_r$	100–500 ms	100–500 ms	100–500 ms	100–500 ms
	Short delay time flat	100–500 ms	100–500 ms	100–500 ms	100–500 ms
	Short delay time ZSI	Yes	Yes	Yes	Yes
Instantaneous protection (I)	Instantaneous pickup	200–1000% x ( $I_n$ ) and M1	200–1000% x ( $I_n$ ) and M1	200–1000% x ( $I_n$ ) and M1	200–1000% x ( $I_n$ ) and M1
	Making current release	Yes	Yes	Yes	Yes
	Off position	Yes	Yes	Yes	Yes
Earth fault protection (G)	Earth fault alarm	No	Yes	Yes	Yes
	Earth fault pickup	25–100% x ( $I_n$ )	25–100% x ( $I_n$ )	25–100% x ( $I_n$ )	24–100% x ( $I_n$ )
	Earth fault delay $I^2t$ at 0.625 x $I_n$	100–500 ms	100–500 ms	100–500 ms	100–500 ms
	Earth fault delay flat	100–500 ms	100–500 ms	100–500 ms	100–500 ms
	Earth fault ZSI	Yes	Yes	Yes	Yes
	Earth fault memory	Yes	Yes	Yes	Yes
Disable ground fault protection		No	No	No	Yes
Neutral protection (N)		Model LSI	Model LSI	Model LSI	Model LSI
<b>System Diagnostics</b>					
Cause of trip LEDs		Yes	Yes	Yes	Yes
Magnitude of trip information		No	No	No	Yes
Remote signal contacts		No	Yes	Yes	Yes
Programmable contacts		No	No	No	2

#### Notes

① Over and undervoltage alarm or trip, over and underfrequency alarm or trip, voltage unbalance alarm or trip, reverse power trip and phase rotation alarm are included.

$I_n$  = Rating plug rating.

$I_r$  = LDPUs setting.

*i* Trip units are only used on IEC breakers with earth fault.

Digitrip Trip Units for Magnum IEC Rated Air Circuit Breakers, continued



Trip Unit Type	Digitrip 520 <i>i</i>	Digitrip 520M <i>i</i>	Digitrip 520M <i>Ci</i>	Digitrip 1150i+ <sup>①</sup>
<b>System Monitoring</b>				
Digital display	No	4-Character LCD	4-Character LCD	24-Character LED
Current (%) full scale sensor	No	Yes +/- 2%	Yes +/- 2%	Yes +/- 1%
Voltage (%) L to L	No	No	No	Yes +/- 1%
Power and energy (%)	No	No	No	Yes +/- 2%
Apparent power kVA and demand	No	No	No	Yes
Reactive power kVAR	No	No	No	Yes
Power factor	No	No	No	Yes
Crest factor	No	No	No	Yes
Power quality—harmonics	No	No	No	Yes
% THD	No	No	No	Yes
<b>System Communications</b>				
Type	—	—	INCOM/PowerNet/Modbus <sup>②</sup> / PROFIBUS <sup>②</sup>	INCOM/PowerNet/TripLink/ Modbus <sup>②</sup> /PROFIBUS <sup>②</sup>
Power supply in breaker	N/A	Optional	Standard	Standard
<b>Additional Features</b>				
Trip log (three events)	No	No	No	Yes
Electronic operations counter	No	No	No	Yes
Testing method <sup>③</sup>	Test set	Test set	Test set	Integral and test set
Waveform capture	No	No	No	Yes
ARMs (Arcflash Reduction Maintenance System Mode)	No	No	Yes	Yes <sup>④</sup>
Breaker health monitor	No	No	No	Yes
Programmable relay functions	No	No	No	Yes <sup>①</sup>

**Notes**

① Over and undervoltage alarm or trip, over and underfrequency alarm or trip, voltage unbalance alarm or trip, reverse power trip and phase rotation alarm are included.

② Requires externally mounted MMINT or PMINT module.

③ Test set for secondary injection.

④ Contact Eaton for availability.

$I_n$  = Rating plug rating.

$I_r$  = LDPU setting.

*i* Trip units are only used on IEC breakers with earth fault.



#### Magnum Options and Accessories

##### Breaker-Mounted Options and Accessories

Magnum breakers are available with a comprehensive array of factory-installed breaker options to enable configured-to-order solutions for specified customer requirements. Field option kits are available to provide easy service, modification and customization of the breaker at the point of use.

- Shunt Trip device (ST).** Provides for remote electrically controlled breaker opening when energized by a rated voltage input
- Spring Charge Motor (MOT).** Charges the breaker closing springs automatically, facilitating remote or local closing. The motor assembly includes its own cut-off switch that changes state at the end of the charging cycle. This contact can be wired out for external indication
- Spring Release device (SR).** Provides for remote electrically controlled breaker closing when its coils are energized by a rated voltage input
- Undervoltage Release (UVR).** Trips the breaker when an existing voltage signal is lost or falls below an established threshold
- Auxiliary Switch.** Up to 6a/6b auxiliary individual dedicated contacts are available for customer use to indicate if the breaker is in the OPEN or CLOSE position
- Mechanical Trip Indicator Flag.** The red trip indicator flag pops out to provide local visual indication when the Digitrip RMS trip unit acts to trip the breaker on an overcurrent condition. Available in two options: an interlocked version that mechanically locks out the breaker until the indicator is manually reset and a non-interlocked version for indication only.
- Bell Alarm/Overcurrent Trip Switch (OTS).** Provides 2 Form C (changeover) contacts that change state when the Digitrip RMS trip unit acts to trip the breaker on an overcurrent condition. The contacts are available for external indication or customer use and are manually reset by the Mechanical Trip Indicator
- Padlockable Pushbutton Cover.** Permits padlocking hinged cover plates to block access to the PUSH ON and PUSH OFF buttons on the breaker faceplate

- Mechanical Operations Counter.** Records mechanical operations of the breaker over its installed life
- Key Off Lock Provisions.** Enables mounting of a single cylinder Kirk®, Castell or Ronis key lock to lock the breaker in the OPEN position
- Latch Check Switch.** Provides 1 Form C (changeover contact) that changes state when the breaker is ready to close. Can be wired to the Spring Release Device for fast transfer applications or wired for external ready-to-close indication



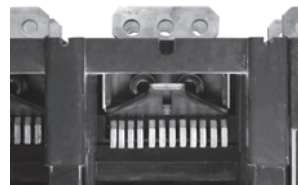
*Shunt Trip, Spring Release and Undervoltage Release Device Installed on Accessory Deck*



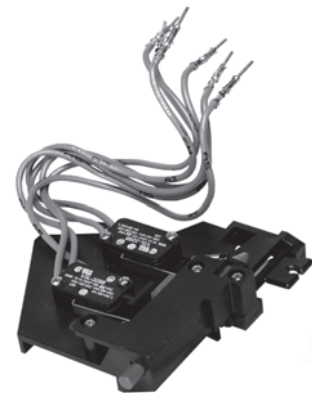
*Auxiliary Switches Come in Modular 2a/2b Contact Stages Providing up to 6a/6b Dedicated Contacts*



*Arc Chutes are Easily Removable for Inspection and Access to Breaker Contacts*



*Heel-Toe Contact Design Provides Demonstrated Long Life and Includes Wear Indicator for Visual Inspection*



*Mechanical Trip Indicator With Bell Alarm (OTS) Switches Mounted*

**Magnum Breaker Control Device Application Guide—Vdc**

Breaker Control Device Nominal Voltage		24 Vdc	32 Vdc	48 Vdc	60 Vdc	125 Vdc	250 Vdc
<b>Shunt Trip (ST)— Trip Circuit</b>							
Operational voltage range	70–110%	17–26 Vdc	—	34–53 Vdc	42–66 Vdc	77–138 Vdc	154–275 Vdc
Power consumption (inrush)	Required for 35 ms <sup>①</sup>	250W	—	250W	250W	450W	450W
Opening time	Seconds	35 ms	—	35 ms	35 ms	35 ms	35 ms
<b>Spring Release (SR)—Close Circuit</b>							
Operational voltage range	70–110%	17–26 Vdc	—	34–53 Vdc	42–66 Vdc	77–138 Vdc	154–275 Vdc
Power consumption (inrush)	Required for 200 ms	250W	—	250W	250W	450W	450W
Closing time	Seconds	40 ms	—	40 ms	40 ms	40 ms	40 ms
<b>Spring Charge Motor (MOT)</b>							
Operational voltage range	85–110% voltage	20–26 Vdc	—	41–53 Vdc	51–66 Vdc	94–138 Vdc	187–225 Vdc
Amperes (running)	Running	12.0A	—	5.0A	4.0A	2.0A	1.0A
Amperes (inrush)	% of running	300%	—	500%	500%	600%	600%
Power consumption	—	300W	—	250W	250W	250W	250W
Charging time	Seconds	5 sec	—	5 sec	5 sec	5 sec	5 sec
<b>Undervoltage Release (UVR)</b>							
Operational voltage range	85–110% voltage	20–26 Vdc	27–35 Vdc	41–53 Vdc	51–66 Vdc	94–138 Vdc	187–275 Vdc
Dropout voltage range	30–60% voltage	7–14 Vdc	10–19 Vdc	14–29 Vdc	18–36 Vdc	33–75 Vdc	66–150 Vdc
Power consumption (inrush)	Required for 200 ms	250W	275W	275W	275W	450W	450W
Power consumption (continuous)	Required for 400 ms	18W	15W	18W	18W	10W	10W
Opening time	Seconds	70 ms	70 ms	70 ms	70 ms	70 ms	70 ms
<b>Auxiliary Switches</b>							
Minimum load contact rating	Inductive load	0.5A	—	0.5A	—	0.5A	0.25A

**Magnum Breaker Control Device Application Guide—Vac**

Breaker Control Device Nominal Voltage		120 Vac	240 Vac	415 Vac	480 Vac	600 Vac
<b>Shunt Trip (ST)— Trip Circuit</b>						
Operational voltage range	70–110%	77–140 Vac	146–264 Vac	—	—	—
Power consumption (inrush)	Required for 35 ms	450 VA	450 VA	—	—	—
Opening time	Seconds	35 ms	35 ms	—	—	—
<b>Spring Release (SR)—close circuit</b>						
Operational voltage range	70–110%	77–140 Vac	146–264 Vac	—	—	—
Power consumption (inrush)	Required for 200 ms	450 VA	450 VA	—	—	—
Closing time	Seconds	40 ms	40 ms	—	—	—
<b>Spring Charge Motor (MOT)</b>						
Operational voltage range	85–110% voltage	93–140 Vdc	177–264 Vdc	—	—	—
Amperes (running)	Running	2.0A	1.0A	—	—	—
Amperes (inrush)	% of running	600%	600%	—	—	—
Power consumption	—	250 VA	250 VA	—	—	—
Charging time	Seconds	5 sec	5 sec	—	—	—
<b>Undervoltage Release (UVR)</b>						
Operational voltage range	85–110% voltage	94–140 Vac	177–264 Vac	323–457 Vac	408–528 Vac	510–660 Vac
Dropout voltage range	30–60% voltage	33–76 Vac	62–144 Vac	114–249 Vac	144–288 Vac	180–360 Vac
Power consumption (inrush)	Required for 200 ms	450 VA	400 VA	480 VA	400 VA	400 VA
Power consumption (continuous)	Required for 400 ms	10 VA	10 VA	10 VA	10 VA	10 VA
Opening time	Seconds	70 ms	70 ms	70 ms	70 ms	70 ms
<b>Auxiliary Switches</b>						
Minimum load contact rating	Inductive load	10A	10A	—	—	—

**Note**

① 100% duty shunt trips require power consumption (inrush) for 200 ms.

# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breaker

#### Wiring Diagrams

#### Typical Magnum Breaker Control Circuit

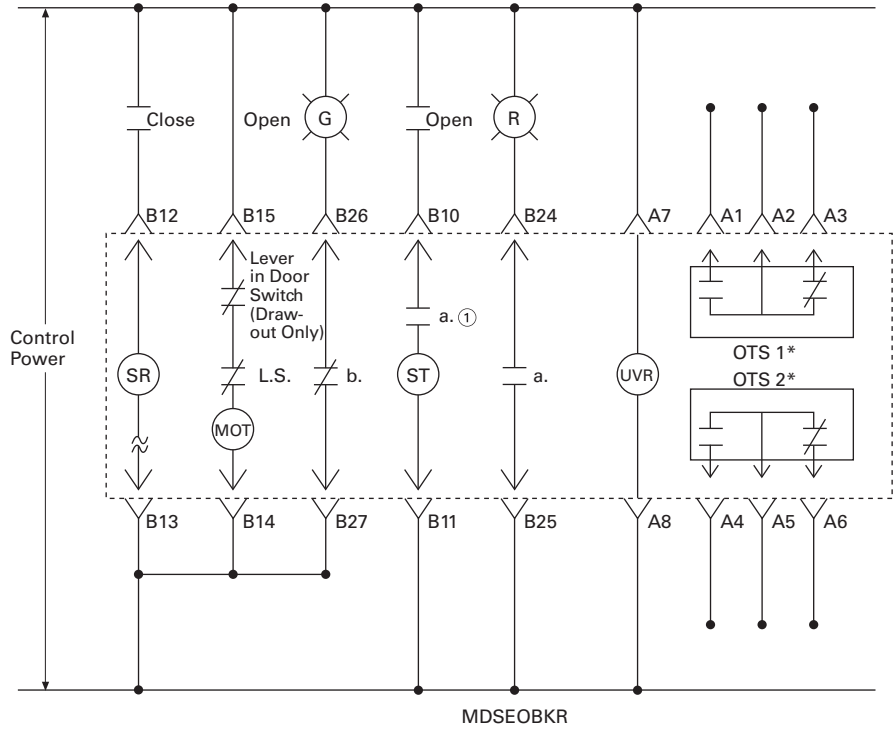
3

- Legend:**  
 LS Limit Switch for Closing Spring  
 MOT Motor for Spring Charging  
 ST Shunt Trip ①  
 SR Spring Release  
 UVR Undervoltage Release  
 OTS Overcurrent Trip Switch

- Description of Operation:**
- 1 — Motor is energized through LS contact.
  - 2 — Motor runs and charges closing spring.
  - 3 — When closing spring is fully charged, LS contacts change state.
  - 4 — Close contacts energize SR coil.
  - 5 — When breaker closes, "b" opens.
  - 6 — LS contacts change state and motor recharges closing springs.

**Notes**

- \* Contacts shown for breaker open (not fully charged), not tripped.
- - - Dotted line denotes Magnum Breaker.
- ① Not needed with 100% duty rated shunt.



Series NRX Low Voltage Power Circuit Breakers



Contents

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Low Voltage Power Circuit Breakers . . . . .	<b>V4-T3-2</b>
Magnum DS Low Voltage Power Circuit Breakers . . . . .	<b>V4-T3-6</b>
Magnum MDSL Current Limiting Power Circuit Breaker . . . . .	<b>V4-T3-11</b>
Magnum SB Low Voltage Insulated Case Circuit Breakers . . . . .	<b>V4-T3-14</b>
Magnum IEC Rated Air Circuit Breakers . . . . .	<b>V4-T3-18</b>
Series NRX Low Voltage Power Circuit Breakers	
Standards and Certifications . . . . .	<b>V4-T3-28</b>
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Catalog Number Selection . . . . .	<b>V4-T3-29</b>
Technical Data and Specifications . . . . .	<b>V4-T3-31</b>
Dimensions . . . . .	<b>V4-T3-33</b>
Medium Voltage Circuit Breakers . . . . .	<b>V4-T3-34</b>

Series NRX Low Voltage Power Circuit Breakers

Product Description

Series NRX is a low voltage power circuit breaker suitable for UL 1558, UL 891, and IEC switchgear and switchboards. The compact size and weight of three-pole drawout with cassette Series NRX, see **Page V4-T3-33**, allows for a 24.00 (609.6 mm) switchgear enclosure.

The breaker ratings are:

- 800A for UL 1066
- 800A, 1200A for UL 489
- 630–1600A IEC 60947-2 from a voltage range of 220–725 Vac

Application Description

The Series NRX is a compact globally certified low voltage power (air) circuit breaker. It is rated for 800 amperes (UL 1066), 800 and 1200 amperes (UL 489) and 630–1600 amperes (IEC 60947-2) with an interrupting capacity of 65 kA with short time withstand at 42 kA at the 440/480 Vac level.

The Series NRX circuit breaker provides all the capabilities of a power circuit breaker in the compact size of a molded case breaker. It offers you the same protection and performance—along with increased flexibility—at half the size of a typical power circuit breaker. The dimensions and design of Series NRX allows up to eight UL 1066 or UL 489 breakers in a 24-inch (600 mm) wide structure. The one frame size, regardless of ampere rating, reduces drawing conversion, structure integration time and parts inventory for several board, gear and machinery applications.

Features, Benefits and Functions

Series NRX utilizes several innovative technologies:

- Rogowski coil—does not saturate like iron core sensors, and one sensor accommodates 200–1600 ampere range. You never have to change a sensor and CTs are not required
- Tension clamp secondary terminals—10A continuous rating at 600V meets UL/CSA/RoHS and UL-94 V0. Mounted directly to fixed breaker or drawout cassette, they reduce wiring throughout enclosure and provide clean, organized wiring schemes
- Breaker-mounted communication modules—communication modules for INCOM™, Modbus® and PROFIBUS mount directly to the cassette, reducing the space and room required in gear for communication capability
- “Direct Drive” mechanism—symmetrically loaded forces of the two-staged stored energy mechanism improves robustness, reliability, and achieves improved breaker life ratings
- Fold-up cassette—with this simple design, all items in a cassette are replaceable without removing the cassette from the cell
- “Arc chute” design
- Breaker-mounted racking or levering-in device—Racking device is mounted on the breaker, decreasing the width of the cassette, because the cassette is not burdened with the cost or parts of the lev-in
- Plug-N-Play accessories—No special tools needed. Accessory comes with plug and wires ready to install

The use of these technologies allows Series NRX to offer a life of 20,000 mechanical operations and 10,000 electrical operations with a high degree of reliability.

**Standards and Certifications**

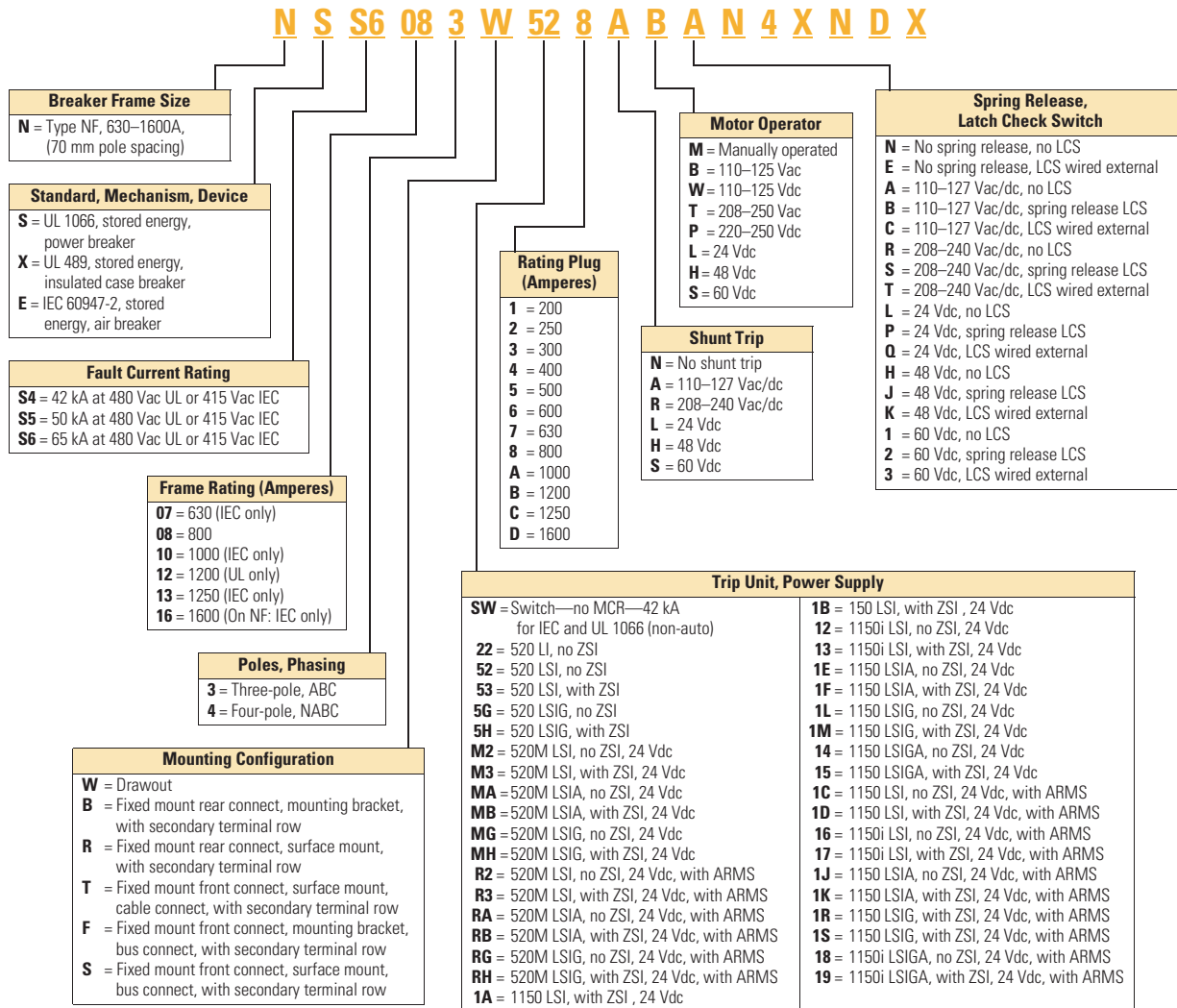
- UL 1066 (low voltage AC power circuit breakers used in enclosures)
- UL 489 (molded-case circuit breakers, molded case switches and circuit breaker enclosures)
- EN 45011
- CEI EN 60947
- BS EN 60439-1 Form 4b
- IEC 60439-1 (low voltage switchgear and controlgear assemblies)
- IEC 60947-1 (low voltage switchgear and controlgear —Part 1 general rules)
- IEC 60947-2 (low voltage switchgear and controlgear —Part 2 circuit breakers)
- IEC 60947-3 (switches, disconnectors, switch-disconnectors and fuse-combination units)
- CSA 22.2 (molded-case circuit breakers, molded case switches and circuit breaker enclosures)
- ANSI C37.51 (metal-enclosed low voltage AC power circuit breaker switchgear assemblies—conformance test procedures)
- ANSI C37.20.1 (metal-enclosed low voltage power circuit breaker switchgear)
- ANSI C37.60 (requirements for overhead, pad-mounted dry-type and submersible automatic reclosers and fault interrupters for AC systems)
- ANSI C37.50 (low voltage AC power circuit breakers used in enclosures—test procedures)
- ANSI C37.17 (for trip devices for AC and general purpose DC low voltage power circuit breakers)
- ANSI C37.16 (low voltage power circuit breakers and AC power circuit protectors—preferred ratings, related requirements, and application recommendations)
- ANSI C37.13 (IEEE® standard for low voltage AC power circuit breakers used in enclosures)
- CCC—China
- KEMA (&CB)
- UL 891 (deadfront switchboard)
- UL 1558 (metal-enclosed low voltage power circuit breaker switchgear)

**Reference Information****List of Instruction Leaflets and Manuals**

Description	Publication Number
Instruction Book for Fixed and Drawout Breaker/Cassette	MN01301001E
IL Drawout Circuit Breaker and Cassette Rejection Interlocks	IL01301006E
IL Auxiliary Switch in Right Accessory Tray	IL01301007E
IL UVR/ST/OTS in Left Accessory Tray	IL01301008E
IL Motor Operator	IL01301010E
IL Spring Release Device and Latch Check Switch (Numbers 5 and 6 are Combining into one Document)	IL01301010E
IL Door Escutcheon and Gasket Kit	IL01301012E
IL Drawout Cassette IP 20 Shutters	IL01301013E
IL Fixed Breaker Arc Hood Kit	IL01301014E
IL Fixed Breaker Front/Rear/Cable Connectors	IL01301015E
IL Drawout Cassette Front/Rear/Cable Connectors	IL01301016E
IL Racking Device Levering Device	IL01301018E
IL Mechanical Pop-Out Indicator and Interlocked Indicator	IL01301019E
IL Breaker and Cassette Phase Barriers	IL01301021E
IL Cassette Rails	IL01301025E
IL Mounting Feet	IL01301030E
IL Surface Mount	IL01301036E
IL Terminal Blocks	IL01301037E
IL Modbus Communication Adapter Module	IL01301034E
IL INCOM Communication Adapter Module	IL01301033E
IL Digitrip 520 and 520M Manual	IL70C1619H01
IL IP55 Cover	IL01301038E
PROFIBUS Communication Module	IL01301035E
IL Kirk Key Lock	IL01301039E
IL Ronis Key Lock	IL01301040E
IL Pushbutton Covers	IL01301041E

Catalog Number Selection

Series NRX Type NF-Frame Circuit Breaker (Exclusionary Rules Apply)



# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### Series NRX Type NF-Frame Circuit Breaker (Exclusionary Rules Apply), continued

**N S S6 08 3 W 52 8 A B A N 4 X N D X**

3

**UVR, Second Shunt Trip**

**N** = None  
**A** = 110–125 Vac/dc UVR  
**R** = 220–250 Vac/dc UVR  
**L** = 24 Vdc UVR  
**H** = 48 Vdc UVR  
**S** = 60 Vdc UVR  
**G** = 32 Vdc UVR  
**1** = 110–127 Vac/dc second shunt trip  
**2** = 208–240 Vac/dc second shunt trip  
**4** = 24 Vdc second shunt trip  
**8** = 48 Vdc second shunt trip  
**9** = 60 Vdc second shunt trip

**Auxiliary, Switches, Label Language**

**E** = No auxiliary switches, no label (parent)  
**2** = 2 Form C, English  
**4** = 4 Form C, English

	Trip Indicator and Bell Alarm	OTS	Secondary Terminal Blocks
<b>N</b>	None	None	Per breaker options
<b>X</b>	Trip indicator	None	Per breaker options
<b>Z</b>	Trip indicator	2 Form C	Per breaker options
<b>M</b>	Interlock trip indicator	None	Per breaker options
<b>Y</b>	Interlock trip indicator	2 Form C	Per breaker options
<b>1</b>	None	None	Full complement
<b>2</b>	Trip indicator	None	Full complement
<b>3</b>	Trip indicator	2 Form C	Full complement
<b>4</b>	Interlock trip indicator	None	Full complement
<b>5</b>	Interlock trip indicator	2 Form C	Full complement

	Padlock Provisions	Key Lock Provisions	Operations Counter
<b>N</b>	No	None	No
<b>A</b>	No	—	Provided
<b>B</b>	Yes (plastic/plastic)	—	No
<b>C</b>	Yes (plastic/plastic)	—	Provided

**Future Use**  
**X** = All product

**Drawout Breaker Shipping, Fixed Breaker Terminals (Door Frame Kit ships as standard unless noted otherwise)**

**D** = Drawout (or parent) breaker shipping alone, without door frame kit  
**C** = Drawout breaker in cassette, no shutters, no terminals  
**1** = Drawout breaker in cassette, no shutters, short vertical/horizontal  
**2** = Drawout breaker in cassette, no shutters, long vertical/horizontal  
**4** = Drawout breaker in cassette, with shutters, short vertical/horizontal  
**5** = Drawout breaker in cassette, with shutters, long vertical/horizontal  
**9** = Drawout breaker in cassette, no shutters, no terminals  
**A** = Fixed terminal adapters for rear connect, short vertical/horizontal  
**E** = Fixed terminal adapters for rear connect, long vertical/horizontal  
**F** = Fixed terminal adapters for rear connect, with mounting feet, short vertical/horizontal  
**H** = Fixed terminal adapters for rear connect, with mounting feet, long vertical/horizontal

#### Series NRX Type NF-Frame Cassette

**NX 12 3 F A B N S N N N C**

**Cassette Family and Breaker Frame**

**NS** = UL 1066 N-Frame  
**NX** = UL 489 N-Frame  
**NE** = IEC N-Frame

**Continuous Ampere Range**

**08** = 800 (UL 1066)  
**12** = 800–1200 (UL 489)  
**16** = 630–1600 (IEC)

**Poles and Phasing (Facing Front of Breaker)**

**3** = Three-pole ABC  
**4** = Four-pole NABC

**Load Terminal Connections**

**F** = With flat tapped pads only  
**G** = With vertical/horizontal bus adapter kit (short style)  
**H** = With front-connected kit  
**N** = No cassette stabs (interunit only)

**Arc Hood**

**A** = Arc hood installed (default)

**Door Frame Gasket and Rejection Kits**

**B** = Door kit included (default), with rejection kit  
**D** = Door kit included, no rejection kit  
**R** = Not included, with rejection kit  
**N** = Not included, with rejection kit

**TOC Switches (Truck Operated Cell)**

**N** = Not included (default)

**Cassette Shipping**

**C** = Cassette only  
**B** = Breaker shipped in cassette

**Future**  
**N** = None

**Future**  
**N** = None

**Secondary Contact Terminals Installed**

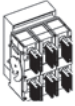
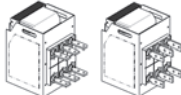


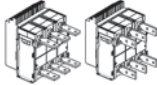
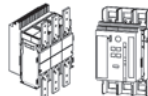


**N** = None  
**B** = Breaker defined, when breaker ships in cassette  
**F** = Full complement  
**C** = Common options when cassette ships alone

**Shutters**

**N** = Not included (default)  
**S** = Included

Technical Data and Specifications

Mounting and Load Connection Configurations

Breaker Type	Breaker Mechanism	Standard Bus Connection Provisions	Rear-Connected Horizontal/Vertical Adapter Kit With and Without Cover (Kits Shipped Unassembled)	Front-Connected Horizontal/Vertical Adapter Kit With and Without Cover (Kits Shipped Unassembled)	Cable-Connected Cable Terminals With Cover
Drawout Breaker	Stored energy	Finger clusters	—	—	—
					
Cassette	—	Rear-connected pre-drilled bus pads			—
					
Fixed	Stored energy	Rear-connected pre-drilled bus pads			
					

UL 1066 Ratings

Description	Rating
Continuous current rating (amperes)	800
<b>Short-Circuit Rating (kA)</b>	
254 Vac	85
508 Vac	65
635 Vac	35
Short-time withstand (kA) <sup>ⓐ</sup>	42

UL 489 Ratings

Description	Rating	Rating
Continuous current rating (amperes)	800	1200
<b>Short-Circuit Rating (kA)</b>		
240 Vac	85	85
480 Vac	65	65
600 Vac	42	42
Short-time withstand (kA)	42	42

IEC 60947-2 Ratings

Description	Rating		Rating		Rating	
Continuous current rating (amperes)	630 and 800		1000 and 1250		1600	
Short-circuit rating (kA)	Icu	Ics	Icu	Ics	Icu	Ics
240/254 Vac	85	50	85	50	85	50
415/435 Vac	65	50	65	50	65	50
690/725 Vac	42	42	42	42	42	42
Short-time withstand = Icw (kA)	42	42	42	42	42	42

Note

<sup>ⓐ</sup> 35 kAIC short-time withstand at 635V level only. All other voltages 42 kAIC short-time withstand.



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## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

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#### Accessory Ratings

##### Shunt Trip

Control Voltages	Frequency	Operational Voltage Range 70–110%	Inrush/Continuous Power Consumption (VA)	Opening Time (ms)
24	DC	17–26	500/5	25
48	DC	34–53	530/5	25
110–127	50–60 Hz	77–140	540/5	25
110–125	DC	77–138	540/5	25
208–240	50–60 Hz	146–264	500/5	25
220–250	DC	154–275	515/5	25

##### UVR

Control Voltages	Frequency	Operational Voltage Range 85–110%	Dropout Volts 35–60%	Inrush/Continuous Power Consumption (VA)	Opening Time (ms)
24	DC	20–26	8–14	500/5	50
32	DC	27–35	11–19	620/5	50
48	DC	41–53	17–29	850/5	50
110–127	50–60 Hz	94–140	44–94	890/5	50
110–125	DC	94–138	44–94	890/5	50
208–240	50–60 Hz	177–264	84–125	910/5	50
220–250	DC	187–275	88–132	910/5	50
380–415	AC	323–457	145–228	960/5	50
480	AC	408–528	168–288	800/8	50
600	AC	510–660	210–360	800/12	50

##### Spring Release

Control Voltages	Frequency	Operational Voltage Range 70–110%	Inrush Power Consumption (VA)	Closing Time (ms)
24	DC	17–26	500	25
48	DC	34–53	530	25
110–127	50–60 Hz	77–140	540	25
110–125	DC	77–138	540	25
208–240	50–60 Hz	146–264	500	25
220–250	DC	154–275	515	25

##### OCT/OTS

Control Voltages	Frequency	Contact Rating (Amperes)
250	50–60 Hz	10
125	DC	0.5
250	DC	0.25

##### Auxiliary Switch

Control Voltages	Frequency	Contact Rating (Amperes)
250	50–60 Hz	10
125	DC	0.5
250	DC	0.25

**Breaker Position/Continuity**

Breaker Position	Continuity Between Red and Black Lead Pairs	Continuity Between Blue and Black Lead Pairs
Open	NO	45 and 43
	NO	46 and 47
	NO	51 and 49
	NO	52 and 53
Closed	44 and 43	NO
	48 and 47	NO
	50 and 49	NO
	54 and 53	NO

**Motor Operator**

Control Voltages	Frequency	Operational Voltage Range 85–110%	Running Current (A)	Typical Inrush Current	Power Consumption (VA)	Maximum Charging Time (Sec)
24	DC	20–26	5	500%	150	3
48	DC	41–53	3	500%	150	3
110–127	50–60 Hz	94–140	2	300%	280	3
110–125	DC	94–138	1	500%	150	3
208–240	50–60 Hz	177–264	1	1000%	280	4
220–250	DC	187–275	1	1000%	280	4

**Control Voltages and Currents**

Control Voltages	24 Vdc	48 Vdc	110–125 Vdc	110–127 Vac	220–250 Vdc	208–240 Vac
<b>Current</b>						
Close current (inrush)	21	11	5	5	2	2
Shunt trip current (ST)—(inrush/continuous)	21 / .2	11 / .1	5 / .04	5 / .04	2 / .02	2 / .02
Charge motor current—(inrush/continuous)	TBD	TBD	5 / 1	6 / 2	10 / 1	10 / 1
<b>Operating Voltage Rating</b>						
Close	17–26	34–53	77–138	77–140	154–275	146–264
Trip	17–26	34–53	77–138	77–140	154–275	146–264
Charge	20–26	41–53	94–138	94–140	187–275	177–264

**Dimensions**

Approximate Dimensions in Inches (mm)

**Series NRX Three-Pole Drawout with Cassette**

Height	Width	Depth	Lbs (kg)
14.18 (360.2)	10.02 (254.5)	10.68 (271.3)	85.00 (38.59)

**Fixed Circuit Breaker and Drawout with Cassette**

Breaker Type	Height	Width	Depth	Lbs (kg)
<b>Fixed</b>				
Three-pole	13.18 (334.8)	8.25 (209.6)	7.15 (181.6)	33.58 (15.23)
Four-pole	13.18 (334.8)	11.00 (279.4)	7.15 (181.6)	44.40 (20.14)
<b>Drawout with Cassette</b>				
Three-pole	14.18 (360.2)	10.02 (254.5)	10.69 (271.5)	85.20 (38.65)
Four-pole	14.18 (360.2)	12.69 (322.3)	10.69 (271.5)	104.00 (47.17)

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## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

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Type VCP-W/VCP-T Medium Voltage Vacuum Circuit Breaker



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Magnum MDSL Current Limiting Power Circuit Breaker . . . . .	<b>V4-T3-11</b>
Magnum SB Low Voltage Insulated Case Circuit Breakers . . . . .	<b>V4-T3-14</b>
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### Medium Voltage Circuit Breakers

#### Product Description

Breakers and structures for switchgear assemblies:

#### ANSI

- VCP-W medium voltage circuit breakers
  - 5/15 kV VCP-W (K>1, K=1, narrow design, extra-capability and generator circuit breakers available)
  - 27 kV and 38 kV (extra-capability circuit breakers available)
  - Ground and test devices
  - Dummy elements
- VCP-T medium voltage circuit breakers
  - 5/15 kV VCP-T (capacitor switching and magnetic actuated circuit breakers available)
  - Ground and test devices
  - Dummy elements

#### IEC

- T-VAC medium voltage circuit breakers
  - 5/15 kV VCP-T (capacitor switching circuit breakers available)
  - Ground and test devices
  - Dummy elements
- VCP-W IEC medium voltage circuit breakers
  - 3.6/7.2/12/17.5 kV
  - 24 kV

#### OEM Structures

- Metal-clad, compartmented design
- Barebones
- Power modules
- Mini modules
- Breaker compartment kits

#### Application Description

Eaton's medium voltage circuit breakers offer the latest in vacuum technology, providing superior control and protection of medium voltage power equipment in utility, industrial, commercial, mining and marine installations. Built in a state-of-the-art ISO® 9002 certified facility, they meet and exceed all ANSI and IEC requirements. Available in drawout configurations, Eaton's vacuum circuit breakers are a result of our ongoing commitment to research and development, which have resulted in significant breakthrough technologies. Each breaker is provided with its unique Quality Assurance Certificate that documents all tests and inspections performed.

**Features, Benefits and Functions****VCP-W Standard Features**

- Eaton's maintenance-free vacuum interrupters with visual contact erosion indicator
- Non-sliding/non-rolling V-flex™ current transfer system
- Glass polyester insulation
- Cycloaliphatic epoxy insulation (optional with Type VCPW-SE breakers) for 27 kV and 38 kV breakers
- Front-accessible operating mechanism
- Electrically operated trip-free, spring stored energy mechanism
- Interlocks that prevent moving a closed circuit breaker into or out of the connected position
- Closing springs automatically discharge before moving the circuit breaker into or out of the enclosure
- Provisions for manual charging of closing springs
- Manual close and trip pushbuttons
- Operations counter
- Closing spring charged/discharged indicator
- Circuit breaker Open/Closed indicator
- Auxiliary switch with 2A/3B for DC and 1A/3B for AC spare contacts
- Spring charging motor, close coil, trip coil, latch check switch and anti-pump relay

**VCP-T Standard Features**

- Small without compromise—significantly smaller and lighter than comparable breakers
- Grounded steel barrier between mechanism and primary conductors
- Spring loaded, silver-plated primary disconnects (drawout breaker)
- Silver-plated primary connections (fixed circuit breaker)
- Manual charging of closing springs (includes shunt trip)
- Integral spring charging handle
- Auxiliary switch (5a and 5b contacts)
- Mechanical operations counter
- 24, 48, 125 and 250 Vdc, 120 and 240 Vac control
- Shunt trip
- ON and OFF pushbuttons
- Integral lifting hooks
- Through- or behind-door operation
- Identified/dedicated secondaries
- Secondary umbilical cord (drawout circuit breaker)
- Secondary disconnect block (fixed circuit breaker)
- Two-step stored energy mechanism
- O–0.3s–CO–15s–CO
- Anti-pump
- Trip free
- Latch check switch
- Visible contact erosion indicator
- Visible contact wipe indicator
- Disconnect, Test and Connect (drawout circuit breaker)
- Integral levering mechanism (drawout circuit breaker)
- Field-installable accessories

**Standards and Certifications**

- Designed, tested and certified in accordance with ANSI and IEC standards
- Applicable ANSI standards C37.04-1979 or 1999, C37.09-1979 or 1999, C37.06-2000 and C37.013
- Internal arc resistance tested to IEC 298, Appendix AA, 25 kA for 1 second
- Drawout circuit breaker fully qualified to IEC 56 by testing inside the IEC 298 switchgear cubicle
- IEEE C37.013 and amendment C37.013a-2007

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## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### Product Selection

Please contact your Eaton sales representative for additional product information and to review your specific application and required product configuration.

#### Technical Data and Specifications

##### ANSI Standards

#### ANSI Standard Ratings—VCP-W Vacuum Circuit Breaker Types Rated on Symmetrical Current Rating Basis—Standard Circuit Breakers <sup>①</sup>

Description	Circuit Breaker Type								
	50 VCP-WND250	50 VCP-W250	50 VCP-W350	50 VCP-W500 (63 kA)	75 VCP-W500	150 VCP-W500	150 VCP-W750	150 VCP-W1000	150 VCP-W1500 (63 kA)
<b>Identification</b>									
Nominal voltage class kV	4.16	4.16	4.16	4.16	7.2	13.8	13.8	13.8	13.8
Nominal three-phase MVA class	250	250	350	—	500	500	750	1000	—
<b>Rated Values</b>									
<b>Voltage</b>									
Maximum voltage E kV rms	4.76	4.76	4.76	4.76	8.25	15	15	15	15
Voltage range factor K <sup>②</sup>	1.24	1.24	1.19	1.00	1.25	1.30	1.30	1.30	1.00
<b>Insulation Level</b>									
Withstand test voltage									
Power frequency (1 min.) kV rms	19	19	19	19	36	36	36	36	36
Impulse kV peak	60	60	60	60	95	95	95	95	95
<b>Current</b>									
Continuous current at 60 Hz amperes	1200	1200	1200	1200	1200	1200	1200	1200	1200
		2000	2000	2000	2000	2000	2000	2000	2000
		3000	3000	3000	3000	3000	3000	3000	3000
Short-circuit current (at rated max. kV) I kA rms	29	29	41	63	33	18	28	37	63
Interrupting time cycles	5	5	5	5	5	5	5	5	5
Permissible tripping delay Y seconds	2	2	2	2	2	2	2	2	2
Maximum voltage divided by K E/K kV rms <sup>②</sup>	3.85	3.85	4.0	4.76	6.6	11.5	11.5	11.5	15.0
<b>Current Values</b>									
Maximum symmetrical interrupting capability Short-time current K x 1 kA rms <sup>②</sup>	36	36	49	63	41	23	36	48	63
Closing and latching capability kA peak	97	97	132	170	111	62	97	130	170
Closing and latching momentary capability	58	58	78	101	66	37	58	77	101
<b>Weight Lbs (kg)</b>									
1200A	345 (157)	350 (159)	460 (209)	525 (238)	375 (170)	350 (159)	350 (159)	460 (209)	525 (238)
2000A	345 (157)	410 (186)	490 (223)	530 (241)	410 (186)	410 (186)	410 (186)	490 (223)	530 (241)
3000A	345 (157)	525 (238)	525 (238)	550 (250)	525 (238)	525 (238)	525 (238)	525 (238)	550 (250)

#### Notes

<sup>①</sup> Applicable ANSI Standards C37.04-1999, C37.06-2000 (including both K >1 and K =1 ratings), and C37.09-1999.

<sup>②</sup> See *Consulting Application Guide* for further information.

**ANSI Standard Ratings—VCP-W Vacuum Circuit Breaker Types Rated on Symmetrical Current Rating Basis—  
Extra Capability Breakers** ①

Description	Circuit Breaker Type								
	50 VCP-W25C	50 VCP-W40C	50 VCP-W50C	50 VCP-W63C	75 VCP-W50C	150 VCP-W25C	150 VCP-W40C	150 VCP-W50C	150 VCP-W63C
<b>Identification</b>									
Nominal voltage class kV	4.16	4.16	4.16	4.16	7.2	13.8	13.8	13.8	13.8
Nominal three-phase MVA class	—	—	—	—	—	—	—	—	—
<b>Rated Values</b>									
<b>Voltage</b>									
Maximum voltage E kV rms	5.95	5.95	5.95	5.95	10.3	17.5	17.5	17.5	15.0
Voltage range factor K ②	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
<b>Insulation Level</b>									
Withstand test voltage									
Power frequency (1 min.) kV rms	24	24	24	24	42	42	42	42	42
Impulse kV peak	75	75	75	75	95	95	95	95	95
<b>Current</b>									
Continuous current at 60 Hz amperes	1200	1200	1200	1200	1200	1200	1200	1200	1200
	2000	2000	2000	2000	2000	2000	2000	2000	2000
	3000	3000	3000	3000	3000	3000	3000	3000	3000
Short-circuit current (at rated max. kV) I kA rms	25	40	50	63	50	25	40	50	63
Interrupting time cycles	3	3	3	3	3	3	3	3	3
Permissible tripping delay Y seconds	2 ③	2 ③	2 ③	2 ③	2 ③	2 ③	2 ③	2 ③	2 ③
Maximum voltage divided by K E/K kV rms ②	5.95	5.95	5.95	5.95	10.3	17.5	17.5	17.5	15.0
<b>Current Values</b>									
Maximum symmetrical interrupting capability Short-time current K x 1 kA rms ②	25	40	50	63	50	25	40	50	63
Closing and latching capability kA peak	97	139	139	175	139	97	139	139	175
Closing and latching momentary capability	58	83	83	104	83	58	83	83	104
<b>Weight Lbs (kg)</b>									
1200A	350 (159)	460 (209)	525 (238)	350 (159)	460 (209)	350 (159)	350 (159)	460 (209)	525 (238)
2000A	410 (186)	490 (223)	530 (241)	410 (186)	490 (223)	410 (186)	410 (186)	490 (223)	530 (241)
3000A	525 (238)	525 (238)	550 (250)	525 (238)	525 (238)	525 (238)	525 (238)	525 (238)	550 (250)

**Notes**

- ① Applicable ANSI Standards C37.04-1999, C37.06-2000 (including both K >1 and K =1 ratings), and C37.09-1999.
- ② See *Consulting Application Guide* for further information.
- ③ Tested for 3 seconds.

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## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### ANSI Standard Ratings—VCP-W Vacuum Circuit Breaker Types Rated on Symmetrical Current Rating Basis—Generator Breakers (to ANSI C37.013) <sup>①</sup>

Description	Circuit Breaker Type					
	50 VCP-WG50	50 VCP-WG63	50 VCP-WG75	150 VCP-WG50	150 VCP-WG63	150 VCP-WG75
<b>Identification</b>						
Nominal voltage class kV	4.16	4.16	4.16	13.8	13.8	13.8
Nominal three-phase MVA class	—	—	—	—	—	—
<b>Rated Values</b>						
<b>Voltage</b>						
Maximum voltage E kV rms	4.76	4.76	4.76	15.0	15.0	15.0
Voltage range factor K <sup>②</sup>	1.00	1.00	1.00	1.00	1.00	1.00
<b>Insulation Level</b>						
Withstand test voltage						
Power frequency (1 min.) kV rms	19	19	19	36	36	36
Impulse kV peak	60	60	60	95	95	95
<b>Current</b>						
Continuous current at 60 Hz amperes	1200	1200	1200	1200	1200	1200
	2000	2000	2000	2000	2000	2000
	3000	3000	3000	3000	3000	3000
	4000	4000	4000	4000	4000	4000
Short-circuit current (at rated max. kV) kA rms	50	63	75	50	63	75
Interrupting time cycles						
1200A	3	3	3	3	3	3
2000A	3	3	3	3	3	3
3000A	3	3	3	3	3	3
4000A	5	5	5	5	5	5
Permissible tripping delay Y seconds						
1200A	1 and 3	1 and 3	1 and 3	1 and 3	1 and 3	1 and 3
2000A	1 and 3	1 and 3	1 and 3	1 and 3	1 and 3	1 and 3
3000A	1 and 3	1 and 3	1 and 3	1 and 3	1 and 3	1 and 3
4000A	1	1	1	1	1	1
Maximum voltage divided by K E/K kV rms <sup>②</sup>	4.76	4.76	4.76	15.0	15.0	15.0
<b>Current Values</b>						
Maximum symmetrical interrupting capability						
Short-time current K x 1 kA rms <sup>②</sup>	50	63	75	50	63	75
Closing and latching capability kA peak	137	173	206	137	173	206
Closing and latching momentary capability	82	103	123	82	103	123
<b>Weight Lbs (kg)</b>						
1200A	525 (238)	525 (238)	926 (419)	525 (238)	525 (238)	926 (419)
2000A	530 (241)	530 (241)	936 (424)	530 (241)	530 (241)	936 (424)
3000A	550 (250)	550 (250)	946 (429)	550 (250)	550 (250)	946 (429)
4000A	956 (433)	956 (433)	956 (433)	956 (433)	956 (433)	956 (433)

#### Notes

<sup>①</sup> Applicable ANSI Standards C37.04-1999, C37.06-2000 (including both K >1 and K =1 ratings), C37.09-1999 and C37.013 (including C37.013a-2007).

<sup>②</sup> See *Consulting Application Guide* for further information.

Available Type VCP-W Vacuum Circuit Breakers Rated on Symmetrical Current Basis Per ANSI Standards (Rated K=1)

Identification	Drawout Circuit Breaker Type									
	50 VCP-W25	50 VCP-W40	50 VCP-W50	50 VCP-W63	75 VCP-W40	75 VCP-W50	150 VCP-W25	150 VCP-W40	150 VCP-W50	150 VCP-W63
<b>Rated Values</b>										
Maximum voltage (V) kV rms	4.76	4.76	4.76	4.76	8.25	8.25	15	15	15	15
Power frequency Hz ①	60	60	60	60	60	60	60	60	60	60
<b>Insulation Level</b>										
Power frequency withstand voltage (1 min.) kV rms	19	19	19	19	36	36	36	36	36	36
Lightning impulse withstand voltage (1.2 x 50 μs) kV peak	60	60	60	60	95	95	95	95	95	95
Continuous current A rms ②	1200	1200	1200	1200	1200	1200	1200 <sup>Ⓢ</sup>	1200	1200	1200 <sup>Ⓢ</sup>
	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000 <sup>Ⓢ</sup>
	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000 <sup>Ⓢ</sup>
<b>Short-Circuit Ratings</b> <sup>Ⓢ</sup>										
<b>(Reference C37.04-1999 and C37.06-2009 except as noted <sup>Ⓢ</sup>)</b>										
Symmetrical interrupting current (I) kA rms sym ③	25	40	50	63	40	50	25	40	50	63
DC component (% DC) ④	50	50	44	55	50	44	50	50	44	55
Asymmetrical interrupting current (I <sub>a</sub> ) kA rms asym total ⑤	31	49	59	80	49	59	31	49	59	80
Closing and latching current (2.6 x I) kA peak	65	104	130	164	104	130	65	104	130	164
Short-time withstand current rms ⑥	25	40	50	63	40	50	25	40	50	63
<b>Transient Recovery Voltage parameters are based on TD-4</b>										
Peak voltage (E <sub>2</sub> ) = (u <sub>c</sub> ) (kV peak)	8.2	8.2	8.2	8.2	14	14	28 <sup>Ⓢ</sup> , 25.7	25.7	25.7	28 <sup>Ⓢ</sup>
Time to peak (T <sub>2</sub> = t <sub>3</sub> x 1.137) (μsec)	50	50	50	50	59	59	75	75	75	75
TRV rise time (t <sub>3</sub> ) (μsec)	44	44	44	44	52	52	66	66	66	66
RRRV = u <sub>c</sub> /t <sub>3</sub> (kV/μsec) ⑦	0.19	0.19	0.19	0.19	0.27	0.27	0.42, 0.39	0.39	0.39	0.42
Interrupting time ms	50	50	50	50	50	50	50	50	50	50
Cycles (60 Hz)	3	3	3	3	3	3	3	3	3	3
Operating duty (duty cycle)	0-0.3s-CO-3m-CO	0-0.3s-CO-3m-CO	0-0.3s-CO-3m-CO	0-0.3s-CO-3m-CO	0-0.3s-CO-3m-CO	0-0.3s-CO-3m-CO	0-0.3s-CO-3m-CO	0-0.3s-CO-3m-CO	0-0.3s-CO-3m-CO	0-0.3s-CO-3m-CO
Mechanical endurance no-load operations ⑧⑨	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000

**Notes**

- ① All circuit breakers are tested at 60 Hz, however, they can also be applied at 50 Hz with no de-rating.
- ② 4000A fan cooled rating is available for 3000A circuit breakers.
- ③ Because the voltage range factor K=1, the short-time withstand current and the maximum symmetrical interrupting current are equal to the rated symmetrical interrupting current.
- ④ Based on the standard DC time constant of 45 ms (corresponding to X/R of 17 for 60 Hz) and the minimum contact parting time as determined from the minimum opening time plus the assumed minimum relay time of 1/2 cycle (8.33 ms for 60 Hz).
- ⑤ The asymmetrical interrupting current, I total, is given by I<sub>a</sub> = I x Sqrt (1 + 2 x %DC x %DC) kA rms asym total.
- ⑥ Duration of short-time current and maximum permissible tripping delay are both 2 seconds for all circuit breakers listed in this table, as required in C37.04-1999, C37.06-2000 and C37.06-2009.
- ⑦ RRRV can also be calculated as = 1.137 x E<sub>2</sub>/T<sub>2</sub>.
- ⑧ Each operation consists of one closing plus one opening.
- ⑨ All 40 and 50 kA circuit breakers exceed required 5000 no-load operations; all 63 kA circuit breakers exceed the required 2000 no-load ANSI operations.
- ⑩ These circuit breakers were tested to the preferred TRV ratings specified in C37.06-2000.



# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

Available Type VCP-W Vacuum Circuit Breakers Rated on Symmetrical Current Basis Per ANSI Standards (Rated K=1), continued

Identification	Drawout Circuit Breaker Type									
	50 VCP-W25	50 VCP-W40	50 VCP-W50	50 VCP-W63	75 VCP-W40	75 VCP-W50	150 VCP-W25	150 VCP-W40	150 VCP-W50	150 VCP-W63
<b>Capacitance Current Switching Capability</b> (Reference C37.04a-2003, C37.06-2009 and C37.09a-2005)										
Cable-charging current										
Class	C2	C2	C2	C2	C2	C2	C2	C2	C2	C2
A rms	3-10	3-10	3-10	7.5-25	7.5-25	7.5-25	7.5-25	7.5-25	7.5-25	7.5-25
Isolated shunt capacitor bank current										
Class	C2	C2	C2	C2	C2	C2	C2, C2, C1	C2, C2, C1	C2, C2, C1	C2
A rms										
1200A	75-630	75-630	75-630	75-630	75-630	75-630	75-630	75-630	75-630	75-630
2000A	75-1000	75-1000	75-1000	75-1000	75-1000	75-1000	75-1000	75-1000	75-1000	75-1000
3000A	75-1600	75-1600	75-1600	75-1600	75-1600	75-1600	75-1600	75-1600	75-1600	75-1600
<b>Back-to-Back Capacitor Switching</b>										
Capacitor bank current										
Class	C2	C2	C2	C2	C2	C2	C2, C2, C1	C2, C2, C1	C2, C2, C1	C2
A rms										
1200A	75-630	75-630	75-630	75-630	75-630	75-630	75-630	75-630	75-630	75-630
2000A	75-1000	75-1000	75-1000	75-1000	75-1000	75-1000	75-1000	75-1000	75-1000	75-1000
3000A	75-1600	75-1600	75-1600	75-1600	75-1600	75-1600	75-1600	75-1600	75-1600	75-1600
Inrush current kA peak	6	6	6	6	6	6	6	6	6	6
Inrush frequency kHz										
1200A	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
2000A	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
3000A	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
<b>Out-of-Phase Switching</b>										
Voltage = 1.44 x V (kV rms)										
	7	7	7	7	12	12	22	22	22	22
Current = 0.25 x I (kA rms)										
	6.3	10	12.5	15.8	10	12.5	6.3	10	12.5	15.8

### VCP-W Vacuum Breaker Types Rated on Symmetrical Current Rating Basis <sup>①</sup>

	Circuit Breaker Type							
	270 VCP-W750	270 VCP-W1000	270 VCP-W1250	270 VCP-W1600	270 VCP-W2000	270 VCP-W25C	270 VCP-W32C	270 VCP-W40C
<b>Identification</b>								
Nominal voltage class kV	27	27	27	27	27	27	27	27
Nominal three-phase MVA class	750	1000	1250	1600	2000	—	—	—
<b>Rated Values</b>								
<b>Voltage</b>								
Maximum voltage E kV rms	27 <sup>②</sup>	27 <sup>②</sup>	27 <sup>②</sup>	27 <sup>②</sup>	27 <sup>②</sup>	27	27	27
Voltage range factor K <sup>③</sup>	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
<b>Insulation Level</b>								
Withstand test voltage								
Power frequency (1 min.) kV rms	60	60	60	60	60	60	60	60
Impulse kV peak	125	125	125	125	125	125	125	125
<b>Current</b>								
Continuous current at 60 Hz amperes	600	600	600	1200	1200	1200	1200	1200
	1200	1200	1200	2000	2000	1600	1600	1600
	2000	2000	2000	—	—	—	—	—
Short-circuit current (at rated maximum kV) <sup>④⑤</sup>	16	22	25	25	40	25 <sup>⑦</sup>	31.5 <sup>⑧</sup>	40 <sup>⑧</sup>
Interrupting time ms (cycles)	83 (5) <sup>⑥</sup>	83 (5) <sup>⑥</sup>	83 (5) <sup>⑥</sup>	83 (5) <sup>⑥</sup>	83 (5) <sup>⑥</sup>	50 (3)	50 (3)	50 (3)
Maximum permissible tripping delay Y seconds	2	2	2	2	2	2.5	1.6	1.0
Transient recovery voltage								
E <sub>2</sub> kV peak	51	51	51	51	51	50	50	50
T <sub>2</sub> μs	105	105	105	105	105	50	50	50
<b>Current Values</b>								
Closing and latching capability (2.6 K times rated short-circuit current) kA peak	43	60	68	85	106	85	100	112
Capacitor switching cable charging amperes	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5
<b>Weight Lbs (kg)</b>								
600A	460 (209)	460 (209)	460 (209)	545 (247)	545 (247)	545 (247)	545 (247)	545 (247)
1200A	480 (218)	480 (218)	480 (218)	560 (254)	600 (272)	560 (254)	560 (254)	560 (254)
2000A	500 (227)	500 (227)	500 (227)	—	—	—	—	—

#### Notes

- ① CESI tested to applicable ANSI standards C37.04, C37.09 and C37.06. Consult Eaton for CESI copies of test reports on file. Operating duty cycle CO-15 seconds-CO. Operating time values: Opening 33–55 ms, closing 50–60 ms and reclosing 18 cycles (300 ms).
- ② Tested at 28.5 kV.
- ③ K = 1.0, therefore E = E/K and I = KI.
- ④ Also maximum interrupting rating and short-time current rating.
- ⑤ Duration of short-time current = 3 seconds, except as noted in footnotes 7, 8 and 9.
- ⑥ Optional interrupting time of 50 ms (3 cycles) is available.
- ⑦ Duration of short-time current = 2.5 seconds.
- ⑧ Duration of short-time current = 1.6 seconds.
- ⑨ Duration of short-time current = 1 second.

# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### Type VCP-W Vacuum Circuit Breaker Ratings

#### Type VCP-W Ratings on Symmetrical Current Rating Basis <sup>①②</sup>

Identification	Circuit Breaker Type				
	380 VCP-W 6 and 380 VCP-WR 16	380 VCP-W 25 and 380 VCP-WR 25	380 VCP-W 32 and 380 VCP-WR 32	380 VCP-W 21 and 380 VCP-WR 21	380 VCP-W 40 and 380 VCP-WR 40
<b>Rated Values</b>					
<b>Voltage</b>					
Nominal voltage class kV rms	34.5	34.5	34.5	34.5	34.5
Maximum voltage V kV rms	38	38	38	38	38
Voltage range factor K <sup>③</sup>	1	1	1	1.65 <sup>⑥</sup>	1
V/K <sup>③</sup> kV rms	38	38	38	23 <sup>⑥</sup>	38
<b>Insulation Level Withstand Test</b>					
Power frequency (1 minute) kV rms	80	80	80	80	80
Lightning impulse 1.2 x 50 <sup>④</sup> kV peak	170	170	170	170	170
<b>Current</b>					
Continuous current at 60 Hz <sup>⑤</sup> A rms	600	600	600	1200	1200
	1200	1200	1200	2000	2000
	1600	1600	1600	3000FC	3000FC
	2000	2000	2000	2500	2500
	—	—	3000FC	—	—
	—	—	2500	—	—
<b>Short-Circuit Current</b>					
Sym. interrupting at V (Isc) kA rms	16	25	31.5	21	40
% DC component (Idc)	47	47	47	47	47
Asym. factor S (ref.)	1.2	1.2	1.2	1.2	1.2
Asym. interrupting (I <sub>l</sub> ) kA rms total	19.2	30.0	37.8	39.5	48.0
Maximum asym. interrupting at V/K (KxIsc) <sup>③</sup> kA rms	16	25	31.5	35 <sup>⑥</sup>	40
Maximum asym. interrupting at V/K (SxKxIsc) <sup>③</sup> kA rms total	19.3	30.0	37.8	42.0	48.0
Closing and latching capability kA peak	43	68	85	95	107
Momentary current withstand capability kA rms total	26	40	50	56	63
Short-time current kA rms	16	25	31.5	35	40
Duration of short-time current s	3	3	3	3	3
Operating duty (duty cycle)	⑧⑩	⑧⑩	⑧⑩ (2500 only ⑧⑩)	⑧⑩ (2500 only ⑧⑩)	⑧⑩
Rated reclosing factor (R) %	100	100	100 (2500 only 0%)	100 (2500 only 0%)	100
<b>Interrupting time <sup>⑥</sup></b>					
rms	83	83	83	83	83
Cycle	5	5	5	5	5
Maximum permissible tripping delay sec.	2	2	2	2	2
Transient recovery voltage (RRRV) kV/μs	0.6	0.6	0.6	0.6	0.6
Mechanical endurance <sup>⑦</sup>	2000	2000	2000	2000	2000

#### Notes

- ① KEMA tested to applicable ANSI standards C37.04-1979, C37.09-1979 and C37.06-1979 (operating duty sequence CO-15s-CO). Typical operating time values: operating 45 ms, closing 75 ms and reclosing 300 ms (18 cycles).
- ② The standard breaker is not rated for capacitor switching. If you require capacitor switching, please refer to the "C" breakers.
- ③ K = 1.0, therefore E = E/K and I = KI. Refer to the *Consulting Application Guide* for more information.
- ④ The ANSI C37.06 standard requires 150 kV BIL. If higher BIL levels are required, please refer to the "C" breakers.
- ⑤ For forced air cooled fixed breaker applications, consult Eaton.
- ⑥ If you require 50 ms (3 cycle) interrupting time, please refer to the "C" breakers.
- ⑦ No-load operations.
- ⑧ At 23 kV rms (rated maximum voltage/K). Rated maximum symmetrical interrupting capability = 35 kA rms (K x 1).
- ⑨ CO-15s-CO.
- ⑩ Rated and tested also for rapid reclosing capability 0-0.3s-CO.
- ⑪ Not rated for rapid reclosing.

Type VCP-WC Vacuum Circuit Breaker Ratings

Type VCP-WC Ratings on Symmetrical Current Rating Basis ①②

Identification	Drawout Circuit Breaker Type				
	380 VCP-W 16C and 380 VCP-WR 16C	380 VCP-W 25C and 380 VCP-WR 25C	380 VCP-W 32C and 380 VCP-WR 32C	380 VCP-W 21C and 380 VCP-WR 21C	380 VCP-W 40C and 380 VCP-WR 40C
<b>Rated Values</b>					
<b>Voltage</b>					
Nominal voltage class kV rms	34.5	34.5	34.5	34.5	34.5
Maximum voltage V kV rms	38	38	38	38	38
Voltage range factor K ③	1	1	1	1.65 ⑥	1
V/K ③ kV rms	38	38	38	23 ⑥	38
<b>Insulation Level Withstand Test</b>					
Power frequency (1 minute) kV rms	80	80	80	80	80
Lightning impulse 1.2 x 50 μs ④ kV peak	170	170	170	170	170
<b>Current</b>					
Continuous current at 60 Hz ⑤ A rms	600	600	600	1200	1200
	1200	1200	1200	2000	2000
	1600	1600	1600	3000FC	3000FC
	2000	2000	2000	2500	2500
	—	—	3000FC	—	—
	—	—	2500	—	—
<b>Short-Circuit Current</b>					
Sym. interrupting at V (Isc) kA rms	16	25	33.1	21	40
% DC component (I <sub>dc</sub> )	75	65	57	52	63
Asym. factor S (ref.)	1.46	1.36	1.3	1.24	1.34
Asym. interrupting (I <sub>l</sub> ) kA rms total	23.3	34.0	42.5	26.1	53.5
Maximum sym. interrupting at V/K (K <sub>xlsc</sub> ) ③ kA rms	16	25	33.1	35 ⑥	40
Maximum asym. interrupting at V/K (SxK <sub>xlsc</sub> ) ③ kA rms total	23.3	34.0	42.5	43.4	53.5
Closing and latching capability kA peak	50	75	91	102	107
Momentary current withstand capability kA rms total	30	44	54	60	65
Short-time current kA rms	16	25	31.5	35	40
Duration of short-time current s	3.09	3.09	3.09	3.21	3.04
Operating duty (duty cycle)	⑧⑨	⑧⑨	⑧⑨ (2500A ⑩)	⑧⑨ (2500A ⑩)	⑧⑨
Rapid reclosing factor (R) %	100	100	100 (2500A N/A)	100 (2500A N/A)	—
Interrupting time ⑥ rms	50	50	50	50	50
Cycles	3	3	3	3	3
Maximum permissible tripping delay sec.	2	2	2	2	2
Transient recovery voltage (RRRV) kV/μs	0.7	0.7	0.7	0.7	—
	1.3	1.3	0.7	1.3	—
	—	—	0.7	1.3	—
	—	—	1.3	0.7	—
	—	—	1.3	—	—
	—	—	0.7	—	—

Notes

- ① KEMA tested to applicable ANSI standards C37.04-1979, C37.09-1979 and C37.06-1979 (operating duty sequence CO–15s–CO). Typical operating time values: operating 45 ms, closing 75 ms and reclosing 300 ms (18 cycles).
- ② The standard breaker is not rated for capacitor switching. If you require capacitor switching, please refer to the “C” breakers.
- ③ K = 1.0, therefore E = E/K and I = KI. Refer to the *Consulting Application Guide* for more information.
- ④ The ANSI C37.06 standard requires 150 kV BIL. If higher BIL levels are required, please refer to the “C” breakers.
- ⑤ For forced air cooled fixed breaker applications, consult Eaton.
- ⑥ If you require 50 ms (3 cycle) interrupting time, please refer to the “C” breakers.
- ⑦ No-load operations.
- ⑧ At 23 kV rms (rated maximum voltage/K). Rated maximum symmetrical interrupting capability = 35 kA rms (K x 1).
- ⑨ CO–15s–CO.
- ⑩ Rated and tested also for rapid reclosing capability 0–0.3s–CO.
- ⑪ Not rated for rapid reclosing.

# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### Type VCP-WC Vacuum Circuit Breaker Ratings

#### Type VCP-WC Ratings on Symmetrical Current Rating Basis, continued<sup>①②</sup>

Identification	Drawout Circuit Breaker Type				
	380 VCP-W 16C and 380 VCP-WR 16C	380 VCP-W 25C and 380 VCP-WR 25C	380 VCP-W 32C and 380 VCP-WR 32C	380 VCP-W 21C and 380 VCP-WR 21C	380 VCP-W 40C and 380 VCP-WR 40C
<b>Capacitor Switching Ratings</b>					
<b>Definite Purpose</b>					
Overhead line current A rms	5	5	5 (2500A N/A)	5 (2500A N/A)	—
Isolated shunt capacitor bank current A rms	250	250	250	250	—
	250 and 1000 (2000A)	250 and 1000 (2000A)	250 and 1000 (2000A and 3000FC) (2500 N/A)	250 and 1000 (2000A and 3000FC) (2500 N/A)	—
<b>Definite Purpose—Back-to-Back Capacitor Switching</b>					
Cable charging current A rms	56	56	53	53	53
Capacitor bank current A rms	250	250	250	250	—
	250 and 1000 (200A)	250 and 1000 (200A)	250 and 1000 (2000A and 3000FC) (2500 N/A)	250 and 1000 (2000A and 3000FC) (2500 N/A)	—
Inrush current kA peak	20	20	20	20	—
	20 and 20 (2000A)	20 and 20 (2000A)	20 and 20 (2000A and 3000FC) (2500 N/A)	20 and 20 (2000A and 3000FC) (2500 N/A)	—
Inrush frequency kHz	4.4	4.4	4.4	4.4	—
	5 and 5 (2000A)	5 and 5 (2000A)	5 and 5 (2000A and 3000FC) (2500 N/A)	5 and 5 (2000A and 3000FC) (2500 N/A)	—
Mechanical endurance (no-load operations) <sup>①</sup>	15,000	15,000	15,000	15,000	15,000

**IEC Standards**

**IEC Standards ①—VCP-W Vacuum Circuit Breaker Types Rated on Symmetrical Current Rating Basis**

Identification	Rated Values							
	Circuit Breaker Type	Voltage kV rms	Insulation Level Power Frequency kV rms Peak	Impulse Withstand kV Peak	Normal Current Amperes	Short-Circuit Breaking Current and 3-Second Short-Time Current kA rms	Short-Circuit Making Current kV Peak	Cable Charging Breaking Current Amperes
36 VCP-WND25	3.6	10	40	630	25	65	10	350 (159)
	3.6	10	40	1250	25	65	10	350 (159)
36 VCP-WND32	3.6	10	40	630	31.5	82	10	350 (159)
	3.6	10	40	1250	31.5	82	10	350 (159)
72 VCP-WND25	7.2	20	60	630	25	65	10	350 (159)
	7.2	20	60	1250	25	65	10	350 (159)
72 VCP-WND32	7.2	20	60	630	31.5	82	10	350 (159)
	7.2	20	60	1250	31.5	82	10	350 (159)
36 VCP-W25	3.6	10	40	630	25	65	10	414 (188)
	3.6	10	40	1250	25	65	10	430 (195)
	3.6	10	40	2000	25	65	10	496 (225)
36 VCP-W32	3.6	10	40	1250	31.5	82	10	414 (188)
	3.6	10	40	2000	31.5	82	10	496 (225)
36 VCP-W40	3.6	10	40	1250	40	104	10	496 (225)
	3.6	10	40	2000	40	104	10	550 (250)
72 VCP-W25	7.2	20	60	630	25	65	10	414 (188)
	7.2	20	60	1250	25	65	10	414 (188)
	7.2	20	60	2000	25	65	10	496 (225)
72 VCP-W32	7.2	20	60	1250	31.5	82	10	414 (188)
	7.2	20	60	2000	31.5	82	10	430 (195)
72 VCP-W40	7.2	20	60	1250	40	104	10	430 (195)
	7.2	20	60	2000	40	104	10	496 (225)
120 VCP-W25	12.0	28	75	630	25	65	25	430 (195)
	12.0	28	75	1250	25	65	25	496 (225)
	12.0	28	75	2000	25	65	25	496 (225)
120 VCP-W32	12.0	28	75	1250	31.5	82	25	430 (195)
	12.0	28	75	2000	31.5	82	25	496 (225)
120 VCP-W40	12.0	28	75	1250	40	104	25	496 (225)
	12.0	28	75	2000	40	104	25	550 (250)
175 VCP-W25	17.5	38	95	630	25	65	—	430 (195)
	17.5	38	95	1250	25	65	—	496 (225)
	17.5	38	95	2000	25	65	—	496 (225)
175 VCP-W32	17.5	38	95	1250	31.5	82	—	430 (195)
	17.5	38	95	2000	31.5	82	—	496 (225)
175 VCP-W40	17.5	38	95	1250	40	104	—	496 (225)
	17.5	38	95	2000	40	104	—	550 (250)
175 VCP-W50	17.5	38	95	1250	50	130	—	1013 (460)
	17.5	38	95	2000	50	130	—	1079 (490)
	17.5	38	95	3150	50	130	—	1156 (525)

**Note**

① IEC Standards 60056 and 60694 apply.

# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

3

#### ANSI Standard Ratings—VCP-T and VCP-TR Vacuum Circuit Breakers (to ANSI C37.04 and C37.09)

Identification	Rated Values						
	Voltage Class kV rms	Power Frequency kV rms	Insulation Level Impulse Withstand kV Peak	Continuous Current Amperes	Short-Circuit <sup>③</sup> Breaking Current kA rms	Short-Circuit Making Current kA Peak	Mechanical Endurance C-0 Operations
50 VCP-T16 and 50 VCP-TR16	4.76	19	60	600	16	42	20,000
	4.76	19	60	800	16	42	20,000
	4.76	19	60	1200	16	42	10,000
	4.76	19	60	1600 <sup>②</sup>	16	42	10,000
50 VCP-T20 and 50 VCP-TR20	4.6	19	60	600	16	52	10,000
	4.6	19	60	800	16	52	10,000
	4.6	19	60	1200	16	52	10,000
	4.6	19	60	1600 <sup>②</sup>	16	52	10,000
50 VCP-T25 and 50 VCP-TR25	4.76	19	60	600	25	65	10,000
	4.76	19	60	800	25	65	10,000
	4.76	19	60	1200	25	65	10,000
	4.76	19	60	1600 <sup>②</sup>	25	65	10,000
75 VCP-T16 and 75 VCP-TR16	8.25	20	60 <sup>①</sup>	600	16	42	20,000
	8.25	20	60 <sup>①</sup>	800	16	42	20,000
	8.25	20	60 <sup>①</sup>	1200	16	42	10,000
	8.25	20	60 <sup>①</sup>	1600 <sup>②</sup>	16	42	10,000
75 VCP-T20 and 75 VCP-TR20	8.25	20	60 <sup>①</sup>	600	20	52	10,000
	8.25	20	60 <sup>①</sup>	800	20	52	10,000
	8.25	20	60 <sup>①</sup>	1200	20	52	10,000
	8.25	20	60 <sup>①</sup>	1600 <sup>②</sup>	20	52	10,000
75 VCP-T25 and 75 VCP-TR25	8.25	20	60 <sup>①</sup>	600	25	65	10,000
	8.25	20	60 <sup>①</sup>	800	25	65	10,000
	8.25	20	60 <sup>①</sup>	1200	25	65	10,000
	8.25	20	60 <sup>①</sup>	1600 <sup>②</sup>	25	65	10,000
150 VCP-T16 and 150 VCP-TR16	15	36	95	600	16	42	10,000
	15	36	95	800	16	42	10,000
	15	36	95	1200	16	42	10,000
	15	36	95	1600 <sup>②</sup>	16	42	10,000
150 VCP-T20 and 150 VCP-TR20	15	36	95	600	20	52	10,000
	15	36	95	800	20	52	10,000
	15	36	95	1200	20	52	10,000
	15	36	95	1600 <sup>②</sup>	20	52	10,000
150 VCP-T25 and 150 VCP-TR25	15	36	95	600	25	65	10,000
	15	36	95	800	25	65	10,000
	15	36	95	1200	25	65	10,000
	15	36	95	1600 <sup>②</sup>	25	65	10,000

#### Notes

- ① Use 15 kV breaker and cassette when 95 kV impulse withstand required.
- ② 1600A VCP-T breaker available.
- ③ Also 2 second short-time current rating.

**ANSI Standard Ratings—VCP-TL/VCP-TRL Vacuum Circuit Breakers (to ANSI C37.04 and C37.09)**

Identification  Circuit Breaker Type ①	Rated Values			Continuous Current Amperes	Short-Circuit Breaking Current ② kA rms	Short-Circuit Making Current kA Peak	Mechanical Endurance ③ C-0 Operations	Approx. Weight Fix/Drawout (Pounds)
	Rated Maximum Voltage kV rms	Insulation Level Power Frequency kV rms	Impulse Withstand kV Peak					
50 VCP-TL16 and 50 VCP-TRL16	4.76	19	60	600	16	42	100,000	153/232
				1200	16	42	100,000	155/234
				1600 ④	16	42	100,000	157/NA
50 VCP-TL20 and 50 VCP-TRL20	4.76	19	60	600	20	52	100,000	159/237
				1200	20	52	100,000	161/239
				1600 ④	20	52	100,000	163/NA
50 VCP-TL25 and 50 VCP-TRL25	4.76	19	60	600	25	65	100,000	166/243
				1200	25	65	100,000	168/245
				1600 ④	25	65	100,000	170/NA
75 VCP-TL16 and 75 VCP-TRL16	8.25	20	75 ⑤	600	16	42	100,000	155/232
				1200	16	42	100,000	157/234
				1600 ④	16	42	100,000	159/NA
75 VCP-TL20 and 75 VCP-TRL20	8.25	20	75 ⑤	600	20	52	100,000	161/239
				1200	20	52	100,000	161/241
				1600 ④	20	52	100,000	163/NA
75 VCP-TL25 and 75 VCP-TRL25	8.25	20	75 ⑤	600	25	65	100,000	166/245
				1200	25	65	100,000	168/247
				1600 ④	25	65	100,000	170/NA
150 VCP-TL16 and 150 VCP-TRL16	15	36	95	600	16	42	100,000	155/234
				1200	16	42	100,000	157/237
				1600 ④	16	42	100,000	159/NA
150 VCP-TL20 and 150 VCP-TRL20	15	36	95	600	20	52	100,000	161/239
				1200	20	52	100,000	163/241
				1600 ④	20	52	100,000	166/NA
150 VCP-TL25 and 150 VCP-TRL25	15	36	95	600	25	65	100,000	168/245
				1200	25	65	100,000	170/247
				1600 ④	25	65	100,000	172/NA

**Notes**

- ① Independent shunt trips are available for use with traditional protective relaying schemes.
- ② Also 2-second short-time current rating.
- ③ Operating mechanism up to 100,000 operations, vacuum interrupter 30,000.
- ④ 1600A available as fixed VCP-TRL/VCP-TRLC circuit breaker only.
- ⑤ Use 15 kV breaker and cassette when impulse withstand >75 kV is required.



# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

3

#### IEC Standard Ratings—T-VAC and T-VACR Vacuum Circuit Breakers (to IEC 62271-100)

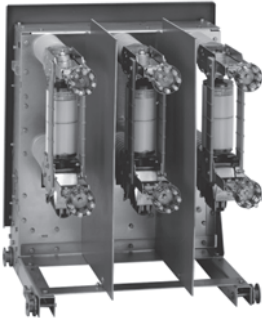
Identification	Rated Values						
	Voltage Class kV rms	Insulation Level Power Frequency Withstand Voltage kV rms	Lightning Impulse ( $U_w$ ) Withstand Voltage kV Peak	Normal Current ( $I_n$ ) Amperes	Short-Circuit <sup>③</sup> Breaking Current kA rms	Short-Circuit Making Current kA Peak	Mechanical Endurance C-0 Operations
72 T-VAC16 and 72 T-VACR16	7.2	20	60	630	16	40	20,000
	7.2	20	60	800	16	40	20,000
	7.2	20	60	1250	16	40	10,000
	7.2	20	60	1600 <sup>②</sup>	16	40	10,000
72 T-VAC20 and 72 T-VACR20	7.2	20	60	630	20	50	10,000
	7.2	20	60	800	20	50	10,000
	7.2	20	60	1250	20	50	10,000
	7.2	20	60	1600 <sup>②</sup>	20	50	10,000
72 T-VAC25 and 72 T-VACR25	7.2	20	60	630	25	63	10,000
	7.2	20	60	800	25	63	10,000
	7.2	20	60	1250	25	63	10,000
	7.2	20	60	1600 <sup>②</sup>	25	63	10,000
120 T-VAC16 and 120 T-VACR16	12	28	75 <sup>①</sup>	630	16	40	20,000
	12	28	75 <sup>①</sup>	800	16	40	20,000
	12	28	75 <sup>①</sup>	1250	16	40	10,000
	12	28	75 <sup>①</sup>	1600 <sup>②</sup>	16	40	10,000
120 T-VAC20 and 120 T-VACR20	12	28	75 <sup>①</sup>	630	20	50	10,000
	12	28	75 <sup>①</sup>	800	20	50	10,000
	12	28	75 <sup>①</sup>	1250	20	50	10,000
	12	28	75 <sup>①</sup>	1600 <sup>②</sup>	20	50	10,000
120 T-VAC25 and 120 T-VACR25	12	28	75 <sup>①</sup>	630	25	63	10,000
	12	28	75 <sup>①</sup>	800	25	63	10,000
	12	28	75 <sup>①</sup>	1250	25	63	10,000
	12	28	75 <sup>①</sup>	1600 <sup>②</sup>	25	63	10,000
175 T-VAC16 and 175 T-VACR16	17.5	38	95	630	16	40	10,000
	17.5	38	95	800	16	40	10,000
	17.5	38	95	1250	16	40	10,000
	17.5	38	95	1600 <sup>②</sup>	16	40	10,000
175 T-VAC20 and 175 T-VACR20	17.5	38	95	630	20	50	10,000
	17.5	38	95	800	20	50	10,000
	17.5	38	95	1250	20	50	10,000
	17.5	38	95	1600 <sup>②</sup>	20	50	10,000
175 T-VAC25 and 175 T-VACR25	17.5	38	95	630	25	63	10,000
	17.5	38	95	800	25	63	10,000
	17.5	38	95	1250	25	63	10,000
	17.5	38	95	1600 <sup>②</sup>	25	63	10,000

#### Notes

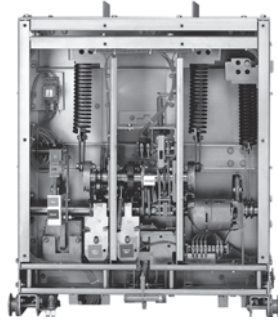
- ① Use 17.5 kV breaker and cassette when 95 kV impulse withstand required.
- ② 1600A T-VAC breaker available.
- ③ Also 3-second short-time current rating.

**Dimensions**

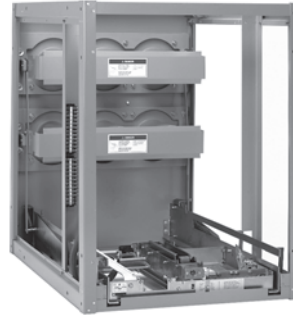
Approximate Dimensions in Inches (mm)



Type VCP-W Circuit Breaker Shown from Rear



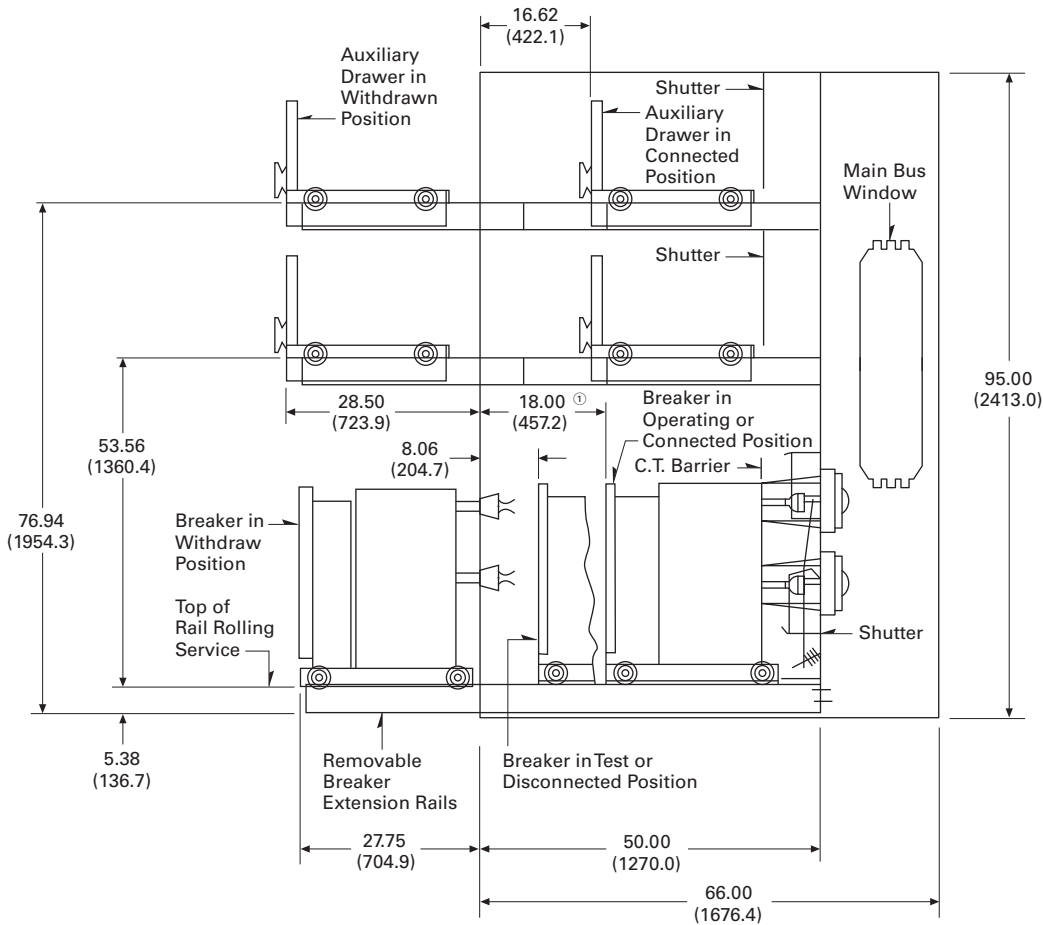
Type VCP-W Circuit Breaker with Deadfront Panel Removed



Mini Module

**5/15 kV VCPW-ND and VCP-W Power Modules**

Power Module, 5/15 kV VCPW-ND 26.00 (660.4) Wide, VCP-W 36.00 (914.4) Wide



**Note**

① VCPW-ND dimensions of breaker travel 15.00 (381.0).

# 3.1

## Power Breakers, Contactors and Fuses

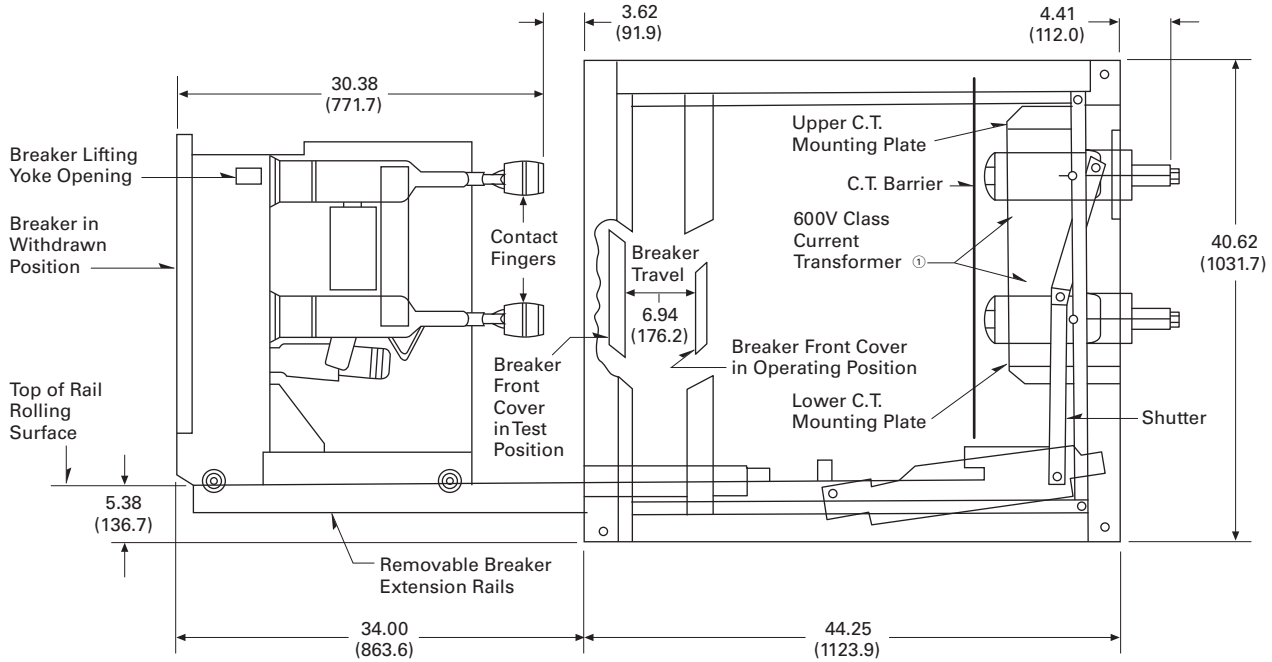
### Power Circuit Breakers

Approximate Dimensions in Inches (mm)

#### 5/15 kV VCPW-ND and VCP-W Mini Modules

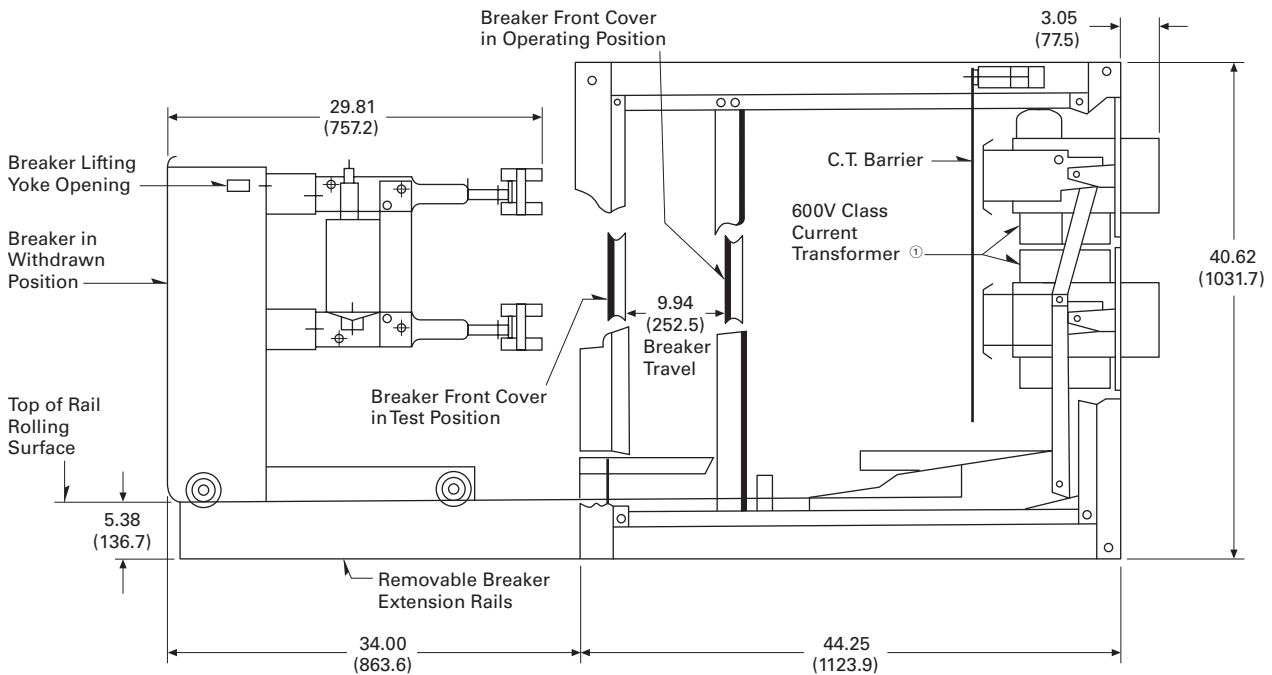
3

#### 5 kV VCPW-ND Mini Module 25.88 (657.4) Wide



#### 5/15 kV VCP-W Mini Module

#### 5/15 kV VCP-W Mini-Module 35.88 (911.4) Wide



**Note**

① Current transformers not supplied.

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Catalog Number Selection . . . . .	<b>V4-T3-52</b>
SL MV Power Contactor 7.2 kV/160–400A . . . . .	<b>V4-T3-53</b>
SL MV Power Contactor 7.2 kV/800A . . . . .	<b>V4-T3-62</b>
SL MV Power Contactor 15 kV/250A . . . . .	<b>V4-T3-66</b>

### Product Overview

#### Voltage Class

Eaton’s SL Medium Voltage Vacuum Contactors are designed to operate at voltages from 2200 to 15,000V, depending on contactor type. Typical system voltages are 2400, 3300, 4160 and 6600V for 7.2 kV contactors and 10,000, 11,000, 13,200 and 13,800V for 15 kV contactors.

#### Altitude

7.2 kV/160–400A SL Contactors are capable of operating in virtually any altitude range. Three versions are offered in Standard, High and Low altitude configurations. No de-rating is necessary for proper operation. Altitude designations are listed in the table below.

#### Altitude

	Altitude Low	Standard	High
<b>7.2 kV/160–400A</b>			
Feet	–11,500 to –3300	–3300 to +6600	+6600 to +13,100
Meters	–3500 to –1000	–1000 to +2000	+2000 to +4000
<b>7.2 kV/800A and 15 kV/250A</b>			
Feet	N/A	–3300 to +11,800	+11,800 to +16,000
Meters	N/A	–1000 to +3600	+3600 to +4900

#### Control Voltage

Control coil voltage should be selectable in the field. Standard voltages available should be 120/60, 110/50, 240/60, 220/50 and 125 Vdc. Coil should pickup at 80% of rated coil voltage and dropout not sooner than 60% of rated coil voltage. Opening time should be field selectable within the range of 30 ms–330 ms for 7.2 kV/160–400A and 50–330 ms for 15 kV/250A. Opening time for 7.2 kV/800A must be specified at order entry and can be either 130 ms, 250 ms or 330 ms.

# 3.2

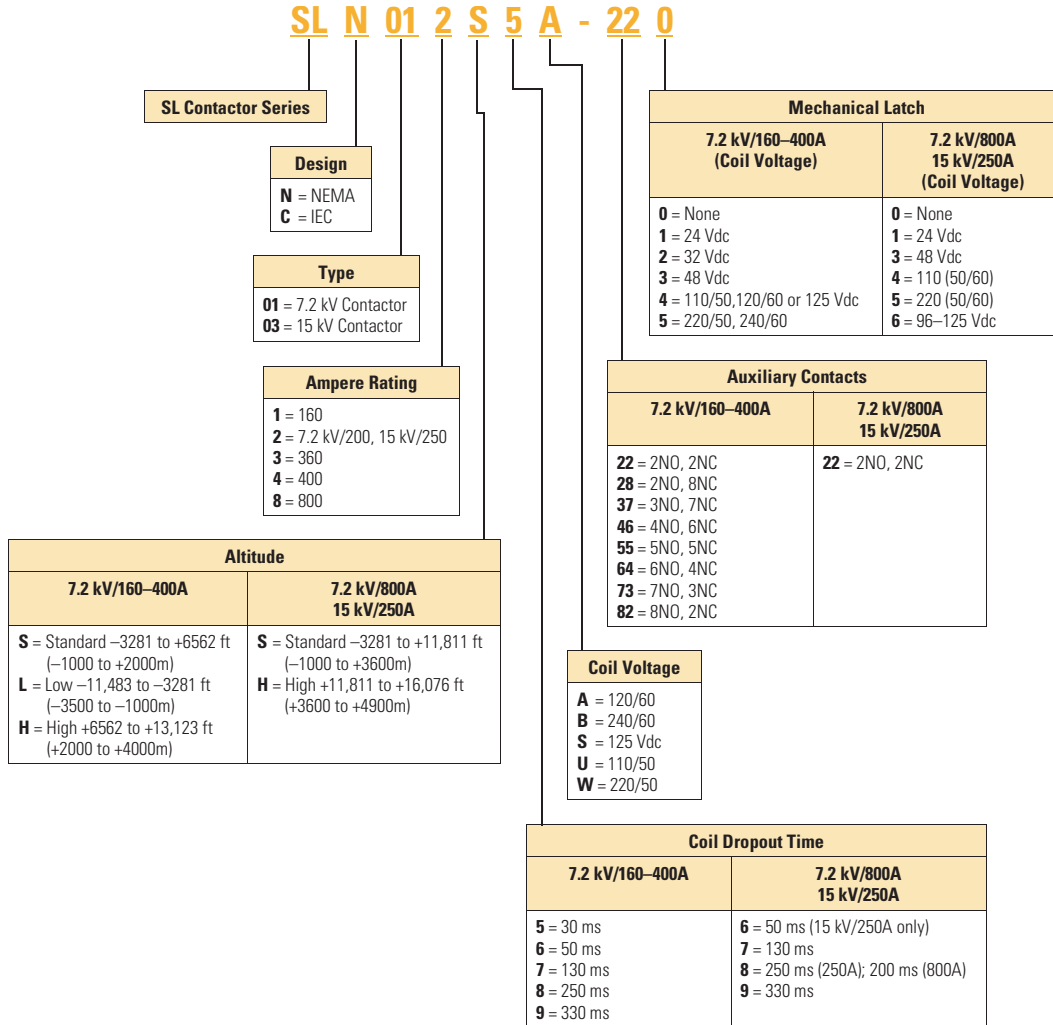
## Power Breakers, Contactors and Fuses

### Medium Voltage Power Contactors

#### Catalog Number Selection

##### Power Contactors

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SL 7.2 kV/160–400A Medium Voltage Contactor



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**SL MV Power Contactor 7.2 kV/160–400A**

**Product Description**

- A single family of contactors for any medium voltage control application. Voltage range of 2200–7200V
- Ampere ratings from 160–400A with induction motor horsepower ranges from 600–5500 hp
- Three different altitude versions
- Leading-edge vacuum technology
- Fully complies with global standards

**Application Description**

**Eaton’s SL Medium Voltage Contactor starting applications:**

- Squirrel-cage induction motors
- Synchronous motors
- Wound-rotor

**Fully applicable to:**

- Full voltage starting
- Reduced voltage starting

**The perfect choice for harsh duty applications:**

- Mining
- Pulp and paper
- HVAC
- Petrochemical
- Automotive
- Many others

**Features, Benefits and Functions**

- Long life—300,000 electrical and over 2 million mechanical
- Mounting flexibility—panel or pedestal mounting provisions are standard. Unit can be mounted in horizontal or vertical position
- Field-selectable settings for coil voltage, AC/DC, and coil dropout time
- Field kits available for auxiliary contacts and mechanical latch. Accessories are common for all sizes
- Special ordering allows unit to be factory pre-set to customer specification, including field kit installation
- Highest quality available— all contactors manufactured within state-of-the-art “ISO-Certified” facilities. 100% made in America

**Easy-to-Install Option Kits (Field Addition)**

- Up to six extra auxiliary contacts
- Mechanical latch—many coil voltages

**Long Life Guarantees High Quality**

- 300,000 electrical operations
- 2.5 million mechanical operations

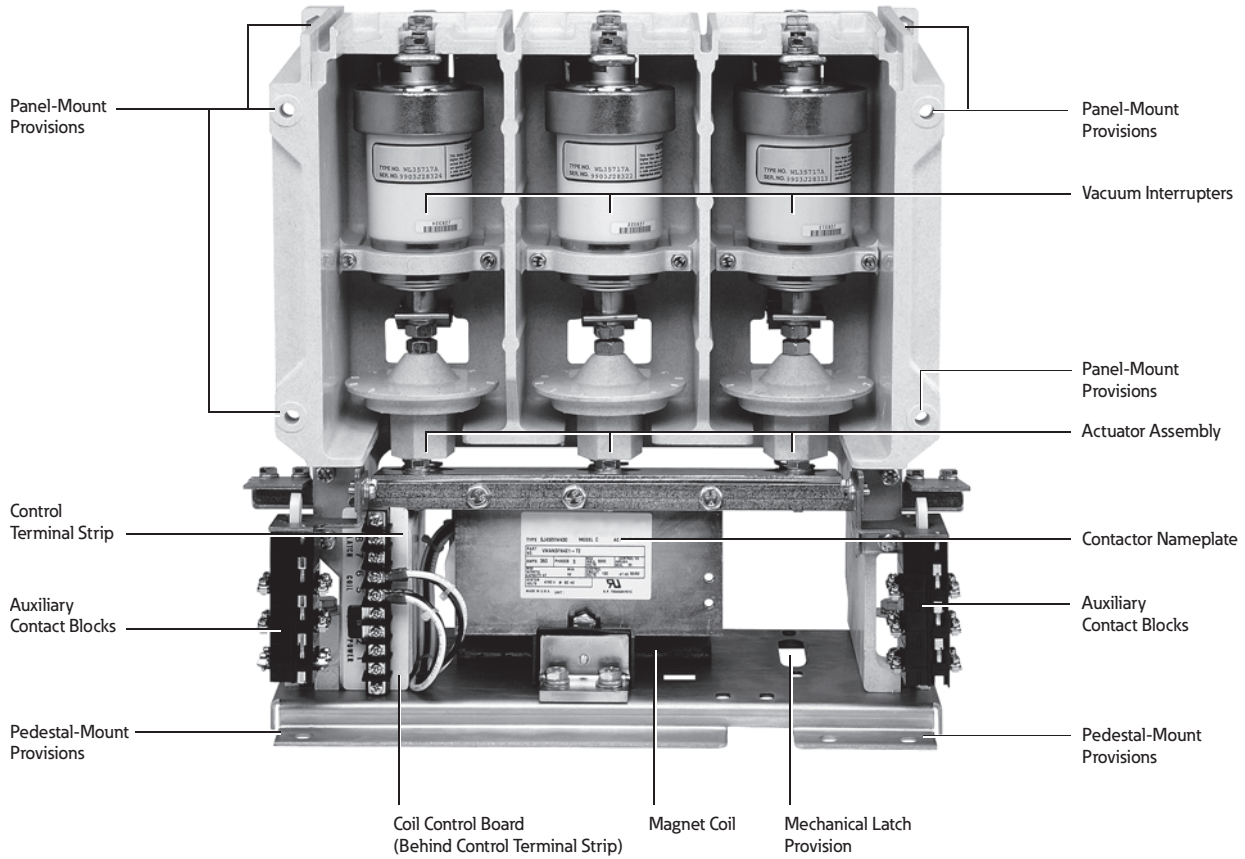
# 3.2

## Power Breakers, Contactors and Fuses

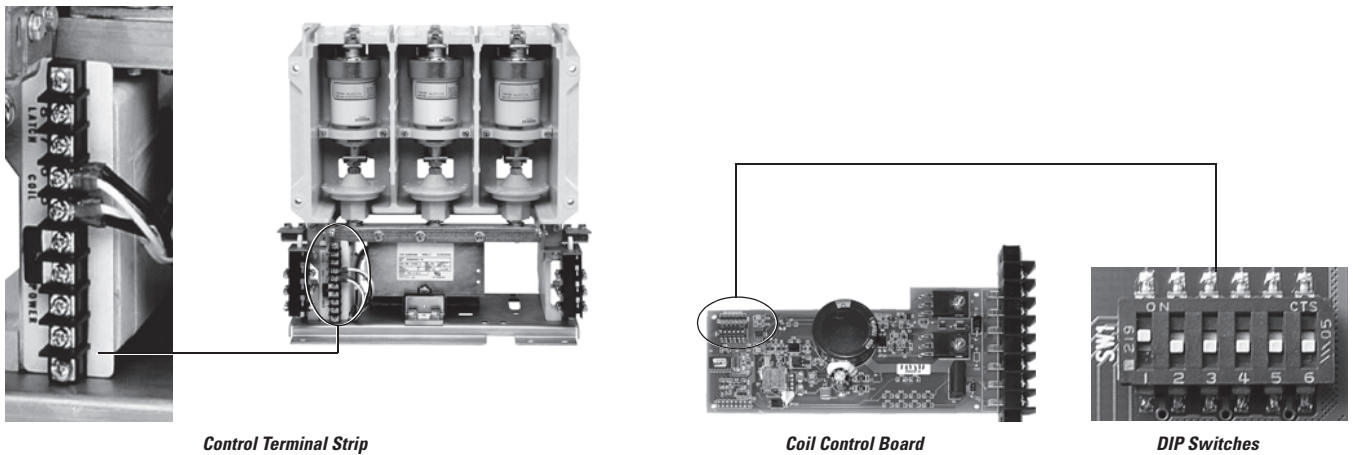
### Medium Voltage Power Contactors

#### SL Series Features (7.2 kV/160–400A)

3



#### Control Settings



### Standards and Certifications

#### Global Acceptability

- NEMA
- ANSI
- IEC

#### Third-Party Verification

- UL
- CSA
- KEMA
- Third-party qualified by UL, CSA, KEMA

#### Design and Test Standards

- UL 347, File No. E63257
- CSA T.I.L. D-21, File No. LR28548
- IEC No. 60470
- ANSI/NEMA ICS 3



### Product Selection

Contact Eaton for pricing.

### Options and Accessories

#### SL Vacuum Contactor Series—Sizes 7.2 kV/160–400A Accessory Kits

##### Mechanical Latch Kit

Field Mount to 7.2 kV/60–400A SL Vacuum Contactor. Coil voltages available in a wide range of AC and DC selections. Easy to install on new and existing units.



Mechanical Latch Kit

##### Auxiliary Contact Kit

Field Mount auxiliary contact kits for 7.2 kV/160–400A SL Vacuum Contactor. Contact kits are available in many configurations of NO-NC.



Auxiliary Contact Kit

##### Mechanical Interlock Kit

Field Mount mechanical interlock kits for 7.2 kV/160–400A SL Vacuum Contactor.



Mechanical Interlock Kit

#### Ordering Information—Mechanical Latch Kit

Coil Voltage	Catalog Number
24 Vdc	SLA-ML24
32 Vdc	SLA-ML32
48 Vdc	SLA-ML48
110/50, 120/60, 125 Vdc selectable	SLA-ML120
220/50, 240/60 selectable	SLA-ML240

#### Ordering Information—Auxiliary Contact Kit

Description	Catalog Number
3NO–3NC additional	SLA-AS33
6NO additional	SLA-AS60
6NC additional	SLA-AS06
5NO–1NC additional	SLA-AS51
4NO–2NC additional	SLA-AS42
2NO–4NC additional	SLA-AS24
1NO–5NC additional	SLA-AS15

#### Ordering Information—Mechanical Interlock Kit

Description	Catalog Number
Vertical or horizontal arrangement	SLA-MI



# 3.2

## Power Breakers, Contactors and Fuses

### Medium Voltage Power Contactors

3

#### Technical Data and Specifications

##### The SL Contactor Ratings

- Voltages of 2200–7200V
- Amperages from 160–400A
- Interrupting ratings as high as 8500A

##### Control Voltages (Field Adjustable)

- 110, 220 Vac, 50 Hz
- 120, 240 Vac, 60 Hz
- 125 Vdc

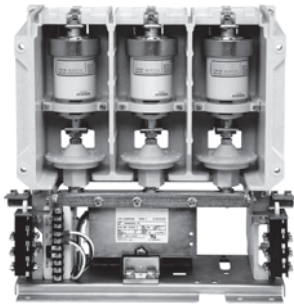
##### Dropout Time (Field Adjustable)

- 30 ms
- 50 ms
- 130 ms
- 250 ms
- 330 ms

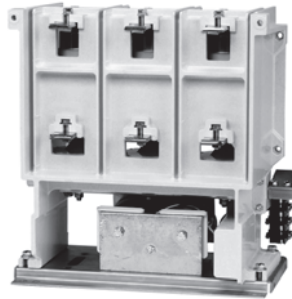
##### Control Voltage Settings (7.2 kV/160–400A)

Setting	SW1	SW2	SW3
110 Vac, 50 Hz	Off	Off	Off
120 Vac, 60 Hz	On	Off	Off
220 Vac, 50 Hz	Off	On	Off
240 Vac, 60 Hz	On	On	Off
125 Vdc	Off	Off	On

##### Front and Rear View (7.2 kV/160–400A)



Front View



Rear View

##### Dropout Time Settings (7.2 kV/160–400A)

Delay Setting	SW4	SW5	SW6
30 ms	Off	Off	Off
50 ms	On	Off	Off
130 ms	Off	On	Off
250 ms	On	On	Off
330 ms	Off	Off	On

##### Altitude Designations (7.2 kV/160–400A)

Altitude	Low	Standard	High
Feet	–11,483 to –3281	–3281 to +6562	+6562 to +13,123
Meters	–3500 to –1000	–1000 to +2000	+2000 to +4000

##### Note

Stock units pre-set to 120/60 Vac.

**SL Series Fuses**

**Fuse Application Table for SL Contactors—7.2 kV/160A**

Motor FLA	Voltage	Suggested Eaton Fuse	Rating	Minimum Opening Time
11–18	2400–4800	5BCLS-30	30–1R	30
18–31	2400–4800	5BCLS-2R	70–2R	30
31–46	2400–4800	5BCLS-3R	100–3R	30
46–62	2400–4800	5BCLS-4R	130–4R	30
62–74	2400–4800	5BCLS-5R	150–5R	30
74–93	2400–4800	5BCLS-6R	170–6R	30
93–137	2400–4800	5BCLS-9R	200–9R	130
137–160	2400–4800	5BCLS-12R	230–12R	130
11–34	5500–6600	7BCLS-2R	70–2R	30
34–46	5500–6600	7BCLS-3R	100–3R	30
46–56	5500–6600	7BCLS-4R	130–4R	30
56–68	5500–6600	7BCLS-5R	150–5R	30
68–85	5500–6600	7BCLS-6R	170–6R	30
85–137	5500–6600	7BCLS-9R	200–9R	50
137–160	5500–6600	7BCLS-12R	230–12R	250
137–160	5500–6600	7BCLS-12R	230–12R	250

**Fuse Application Table for SL Contactors—7.2 kV/260A**

Motor FLA	Voltage	Suggested Eaton Fuse	Rating	Minimum Opening Time
11–18	2400–4800	5BCLS-30	30–1R	30
18–31	2400–4800	5BCLS-2R	70–2R	30
31–46	2400–4800	5BCLS-3R	100–3R	30
46–62	2400–4800	5BCLS-4R	130–4R	30
62–74	2400–4800	5BCLS-5R	150–5R	30
74–93	2400–4800	5BCLS-6R	170–6R	30
93–137	2400–4800	5BCLS-9R	200–9R	130
137–200 ①	2400–4800	5BCLS-12R	230–12R	130
11–34	5500–6600	7BCLS-2R	70–2R	30
34–46	5500–6600	7BCLS-3R	100–3R	30
46–56	5500–6600	7BCLS-4R	130–4R	30
56–68	5500–6600	7BCLS-5R	150–5R	30
68–85	5500–6600	7BCLS-6R	170–6R	30
85–137	5500–6600	7BCLS-9R	200–9R	50
137–200 ①	5500–6600	7BCLS-12R	230–12R	250

**Fuse Application Table for SL Contactors—7.2 kV/360A**

Motor FLA	Voltage	Suggested Eaton Fuse	Rating	Minimum Opening Time
11–18	2400–4800	5BCLS-30	30–1R	30
18–31	2400–4800	5BCLS-2R	70–2R	30
31–46	2400–4800	5BCLS-3R	100–3R	30
46–62	2400–4800	5BCLS-4R	130–4R	30
62–74	2400–4800	5BCLS-5R	150–5R	30
74–93	2400–4800	5BCLS-6R	170–6R	30
93–137	2400–4800	5BCLS-9R	200–9R	130
137–187	2400–4800	5BCLS-12R	230–12R	130
187–200	2400–4800	5BCLS-12R	230–12R	130
200–360	2400–4800	N/A	—	—
11–34	5500–6600	7BCLS-2R	70–2R	30
34–46	5500–6600	7BCLS-3R	100–3R	30
46–56	5500–6600	7BCLS-4R	130–4R	30
56–68	5500–6600	7BCLS-5R	150–5R	30
68–85	5500–6600	7BCLS-6R	170–6R	30
85–137	5500–6600	7BCLS-9R	200–9R	50
137–200	5500–6600	7BCLS-12R	230–12R	250
187–200	5500–6600	7BCLS-12R	230–12R	250
200–360	5500–6600	N/A	—	—

**Fuse Application Table for SL Contactors—7.2 kV/400A**

Motor FLA	Voltage	Suggested Eaton Fuse	Rating	Minimum Opening Time
11–18	2400–4800	5BCLS-30	30–1R	30
18–31	2400–4800	5BCLS-2R	70–2R	30
31–46	2400–4800	5BCLS-3R	100–3R	30
46–62	2400–4800	5BCLS-4R	130–4R	30
62–74	2400–4800	5BCLS-5R	150–5R	30
74–93	2400–4800	5BCLS-6R	170–6R	30
93–137	2400–4800	5BCLS-9R	200–9R	30
137–187	2400–4800	5BCLS-12R	230–12R	30
187–273	2400–4800	5BCLS-18R	390–18R	50
273–400 ②	2400–4800	5BCLS-24R	450–24R	130
11–34	5500–6600	7BCLS-2R	70–2R	30
34–46	5500–6600	7BCLS-3R	100–3R	30
46–56	5500–6600	7BCLS-4R	130–4R	30
56–68	5500–6600	7BCLS-5R	150–5R	30
68–85	5500–6600	7BCLS-6R	170–6R	30
85–137	5500–6600	7BCLS-9R	200–9R	30
137–187	5500–6600	7BCLS-12R	230–12R	30
187–273	5500–6600	7BCLS-18R	390–18R	50
273–400 ②	5500–6600	7BCLS-24R	450–24R	250

**Notes**

① For FLA > 180, maximum acceleration time = 4.5 seconds.

② For FLA > 360, maximum acceleration time = 6 seconds.

Fuse selections based on LRC = FLA x 6 with acceleration time of 10 seconds except where otherwise noted.

# 3.2

## Power Breakers, Contactors and Fuses

### Medium Voltage Power Contactors

#### SL Series Ratings

#### Type SL Vacuum Contactor Ratings (7.2 kV/160–400A)

Rated Utilization Voltage	Interrupting Rating		Application Table					Maximum Insulation Voltage
	NEMA Unfused (E1) kA	NEMA Fused (E2) kA	Induction Motor Horsepower	Synchronous Motor Horsepower (0.8 PF) (1.0 PF)		Transformer kVA	Capacitor kVAR	
<b>7.2 kV/160A Frame</b>								
2200–2500	4.5	50	600	600	800	600	480	7200
3000–3600	4.5	50	900	900	1000	800	640	7200
3800–4800	4.5	50	1200	1200	1400	1000	960	7200
6000–6900	4.5	50	1800	1800	2200	1600	1320	7200
<b>7.2 kV/200A Frame</b>								
2200–2500	4.5	50	800	800	1000	750	600	7200
3000–3600	4.5	50	1100	1100	1250	1000	800	7200
3800–4800	4.5	50	1500	1500	1750	1250	1200	7200
6000–6900	4.5	50	2250	2250	2750	2000	1650	7200
<b>7.2 kV/360A Frame</b>								
2200–2500	4.5	50	1500	1500	1750	1200	1000	7200
3000–3600	4.5	50	2000	2000	2500	1600	1475	7200
3800–4800	4.5	50	2500	2500	3000	2000	2150	7200
6000–6900	4.5	50	4000	4000	5000	3200	2950	7200
<b>7.2 kV/400A Frame</b>								
2200–2500	8.5	50	1750	1750	2000	1500	1200	7200
3000–3600	8.5	50	2250	2250	2500	2000	1650	7200
3800–4800	8.5	50	3000	3000	3500	2500	2400	7200
6000–6900	8.5	50	4500	4500	5500	4000	3300	7200

#### Rating Specifications (7.2 kV/160–400A)

Ampere Rating	7.2 kV/160A	7.2 kV/200A	7.2 kV/360A	7.2 kV/400A
<b>Maximum Interrupting Current</b> (Three operations—amperes)	4500	4500	4500	8500
<b>Rated Current</b>	160	200	360	400
<b>IEC Make-Break Capability—AC4 (Amperes)</b>				
Make	1600	2000	3600	4000
Break	1280	1600	2880	3200

**Product Specifications**

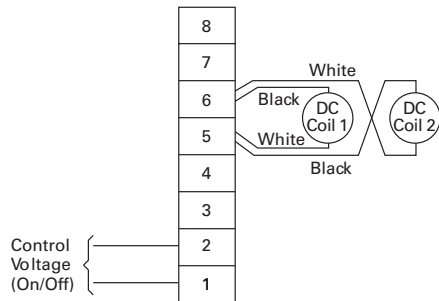
**7.2 kV/160–400A**

- Short-time current:
  - 30 seconds: 2400A
  - 1 second: 6000A
  - 8.7 ms: 63 kA peak (0.5 cycle)
- Normal service altitude: –3281 to +6562 ft (–1000 to +2000m)
- Mechanical life: 2.5 million
- Electrical life:
  - 6 x Rated Make/1x Rated Break: 300,000 operations
  - 6 x Rated Make/6 x Rated Break: 300,000 operations
- BIL (impulse withstand): 60 kV (1.2 x 50 microseconds)
- Dielectric strength: 20 kV rms (1 minute)
- Closing time: 80 milliseconds (energization to contact touch)
- Selectable opening times:
  - 30 milliseconds (2 cycles)
  - 50 milliseconds (3 cycles)
  - 130 milliseconds (8 cycles)
  - 250 milliseconds (15 cycles)
  - 330 milliseconds (20 cycles)
- Arcing time: 12 ms (0.75 cycle) or less
- Pickup voltage: 80% rated coil voltage
- Dropout voltage: 60% rated coil voltage
- Control voltages:
  - AC/Hz: 110/50, 120/60, 220/50, 240/60
  - DC: 125
- Control circuit burden:
  - Closing: (200 milliseconds)
    - 110/120 AC, 125 DC 1 kVA
    - 220/240 AC 1.8 kVA
  - Holding:
    - 110/120 AC, 125 DC 40 VA
    - 220/240 AC 50 VA
- Auxiliary contact rating:
  - 600V (maximum)
  - 10A continuous current
  - Making capacity
    - AC: 7200 VA
    - DC: 125 VA
  - Breaking capacity
    - AC: 720 VA
    - DC: 125 VA
- Latch (when specified)
  - Mechanical life: 250,000 operations
  - Trip voltage
    - DC: 24V
    - DC: 125V
    - AC: 110/120V
  - Minimum trip voltage: 80% rated coil voltage
  - Trip burden
    - 24 Vdc: 400 VA
    - 48 and 125 Vdc: 400 VA
    - 110 and 120 Vac: 400 VA
    - 220 and 240 Vac: 400 VA
  - Trip time (2 cycles): 30 ms
  - Weight
    - 150–360A: 47 lbs (21.3 kg)
    - 400A: 49 lbs (22.2 kg)

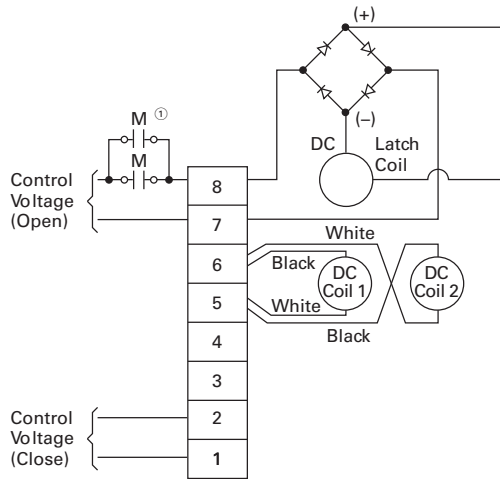
**Wiring Diagrams**

**Electrical Connections Diagrams (7.2 kV/160–400A)**

**Connection for Magnetically Held Contactor**



**Connections for Mechanically Latched Contactor**



**Note**

① M contacts are connected in parallel for ≤48V. M contacts are connected in series for > 48V.

# 3.2

## Power Breakers, Contactors and Fuses

### Medium Voltage Power Contactors

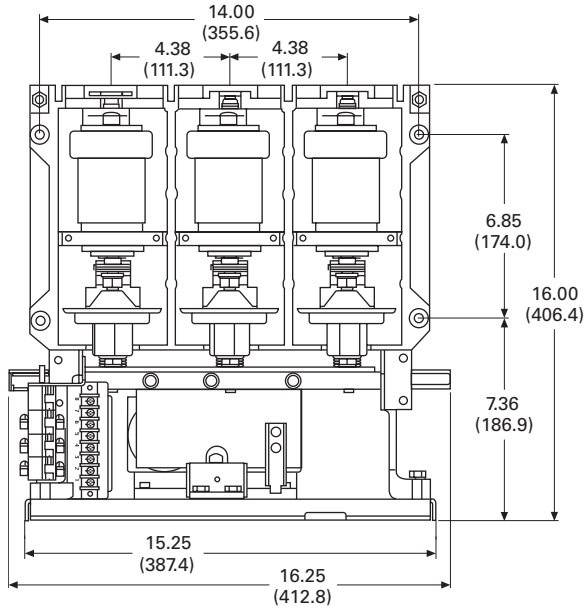
#### Dimensions

Approximate Dimensions in Inches (mm)

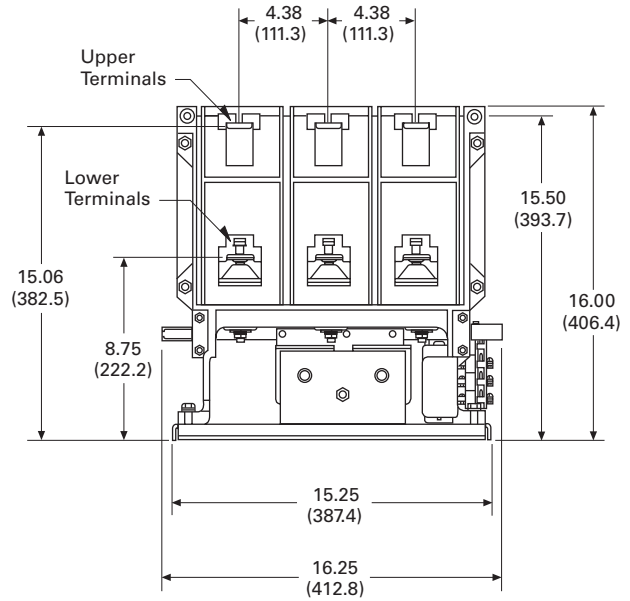
#### Dimensional Drawings 7.2 kV/160-400A

3

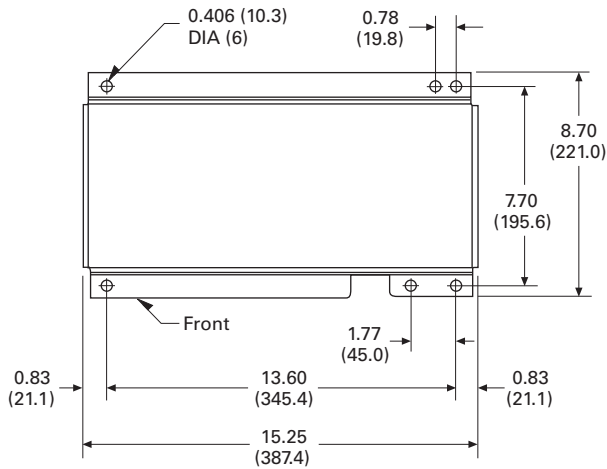
#### Front



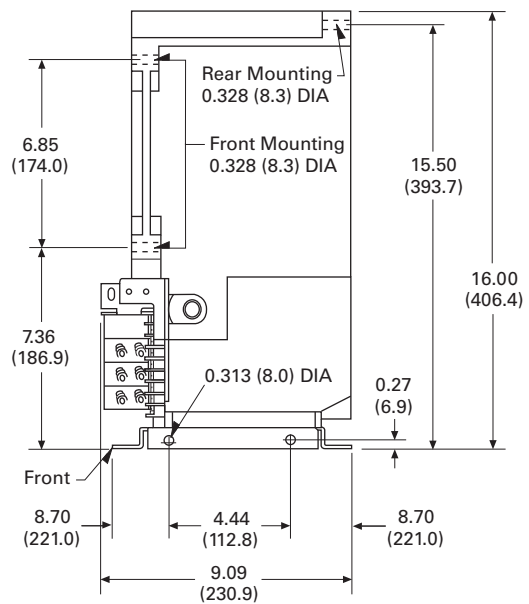
#### Rear



#### Base Plate

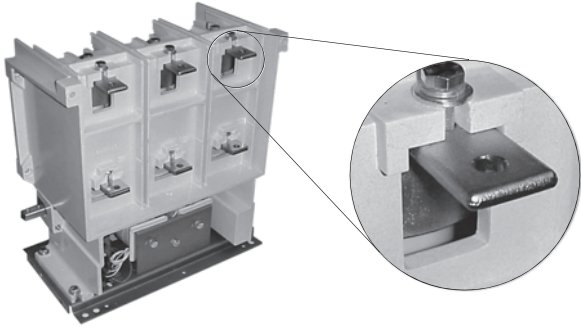


#### Side

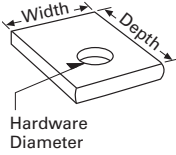


Approximate Dimensions in Inches (mm)

### Lug Terminal



#### Lug Terminal



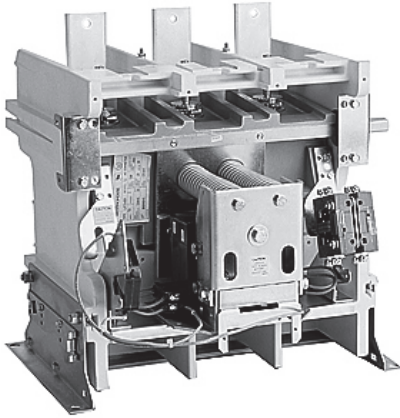
#### Upper Lug Terminal

Contactor Ampere Rating	Width	Depth	Hardware (Bolt Diameter)
7.2 kV/160	0.75 (19.1)	1.31 (33.3)	10
7.2 kV/200	1.00 (25.4)	1.31 (33.3)	10
7.2 kV/360	1.00 (25.4)	1.31 (33.3)	10
7.2 kV/400	1.00 (25.4)	1.31 (33.3)	10

#### Lower Lug Terminal

Contactor Ampere Rating	Width	Depth	Hardware (Bolt Diameter)
7.2 kV/160	1.25 (31.8)	1.10 (27.9)	10
7.2 kV/200	1.25 (31.8)	1.10 (27.9)	10
7.2 kV/360	1.25 (31.8)	1.10 (27.9)	10
7.2 kV/400	1.25 (31.8)	1.10 (27.9)	10

SL 7.2 kV/800A Medium Voltage Contactor



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SL MV Power Contactor 7.2 kV/800A	
Options and Accessories . . . . .	<b>V4-T3-63</b>
Technical Data and Specifications . . . . .	<b>V4-T3-63</b>
Dimensions . . . . .	<b>V4-T3-65</b>
SL MV Power Contactor 15 kV/250A . . . . .	<b>V4-T3-66</b>

### SL MV Power Contactor 7.2 kV/800A

#### Product Description

- A single family of contactors for any medium voltage control application. Voltage range of 2200–7200V
- 800A rating with induction motor horsepower ranges from 3000–10,000 hp

#### Application Description

**Eaton's SL Medium Voltage Contactors starting applications:**

- Squirrel-cage induction motors
- Synchronous motors
- Wound-rotor

**Fully applicable to:**

- Full voltage starting
- Reduced voltage starting

**The perfect choice for harsh duty applications:**

- Mining
- Pulp and paper
- HVAC
- Petrochemical
- Automotive
- Many others

#### Features, Benefits and Functions

- Two different altitude versions
- Leading-edge vacuum technology
- Long life—100,000 electrical and 300,000 mechanical
- Special ordering allows unit to be factory pre-set to customer specification, including field kit installation
- Highest quality available—all contactors manufactured within state-of-the-art "ISO-Certified" facilities. 100% made in America

**Factory Installed Option Kit**

- Mechanical latch—many coil voltages

**Long Life Guarantees High Quality**

- 100,000 electrical operations
- 300,000 mechanical operations

#### Standards and Certifications

**Acceptability**

- NEMA
- ANSI
- IEC

**Third-Party Verification**

- UL
- CSA
- KEMA

**Design and Test Standards**

- UL 347, File No. E63257
- CSA T.I.L. D-21, File No. LR28548
- ANSI/NEMA ICS 3
- IEC 60470

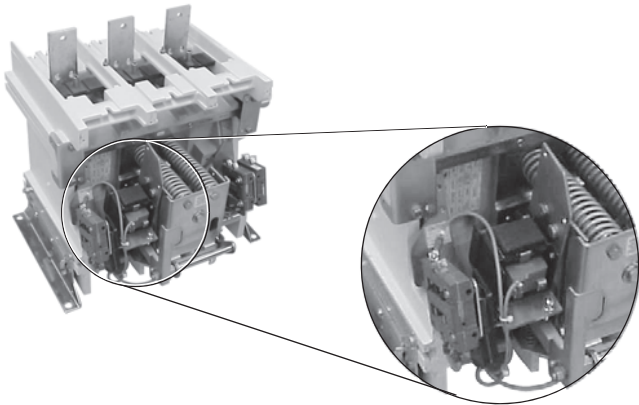


**Product Selection**

Contact Eaton for pricing.

**Options and Accessories**

**SL Series—Accessory Options 800A**



*Mechanical Latch Assembly 800A*

**Mechanical Latch Option—  
SL Vacuum Contactor  
Size 800A**

Factory installed for 800A SL Vacuum Contactor. Coil voltages available in a wide range of AC and DC selections.

**Technical Data and Specifications**

**The SL Contactor Ratings**

- Voltages of 2200–7200V
- 800A (720A enclosed)
- Interrupting rating of 12,500A

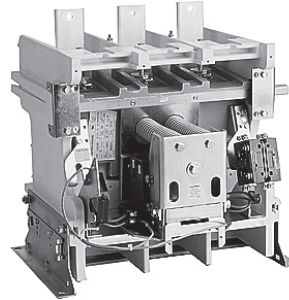
**Control Voltages**

- 110, 220 Vac, 50 Hz
- 120, 240 Vac, 60 Hz
- 125 Vdc

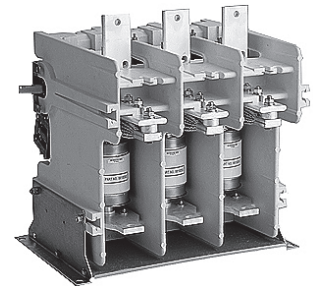
**Dropout Time**

- 130–330 ms

**Front and Rear View 7.2 kV/800A**



*Front View*



*Rear View*

**SL Series Fuses**

**Fuse Application Table for SL Contactors 7.2 kV/SL-800**

Motor FLA	Voltage	Suggested Eaton Fuse	Rating	Minimum Opening Time
225–360	2400–4800	5BCLS-24R	450–24R	50
360–449	2400–4800	5BCLS-36R	650–36R	130
450–720	2400–4800	5BCLS-44R	800–44R	250
225–400	5500–6600	7BCLS-24R	450–24R	50
400–449	5500–6600	7BCLS-36R	650–36R	130
450–720	5500–6600	7BCLS-44R	800–44R	250

**Note**

Fuse selections based on LRC = FLA x 6 with acceleration time of 10 seconds except where otherwise noted.



# 3.2

## Power Breakers, Contactors and Fuses

### Medium Voltage Power Contactors

#### SL Series Ratings

#### Type SL Vacuum Contactor Ratings 7.2 kV/SL-800

Rated Utilization Voltage	Interrupting Rating		Application Table					Maximum Insulation Voltage
	NEMA Unfused (E1) kA	NEMA Fused (E2) kA	Induction Motor Horsepower	Synchronous Motor Horsepower (0.8 PF) (1.0 PF)		Transformer kVA	Capacitor kVAR	
2200–2500	12.5 (50 MVA)	50 (200 MVA at 2300V)	3000	3000	3500	2500	2400	7200
3000–3600	12.5 (50 MVA)	50 (285 MVA at 3300V)	4000	4000	5000	3500	3200	7200
3800–5000	12.5 (75 MVA)	50 (400 MVA at 4600V)	5000	5000	6000	4500	4000	7200
6000–7200	12.5 (100 MVA)	50 (570 MVA at 6600V)	8000	8000	10,000	6000	4800	7200

#### Rating Specifications 7.2 kV/SL-800

Ampere Rating	7.2 kV/800A
<b>Maximum Interrupting Current</b> (Three operations—amperes)	12,500
<b>Rated Current</b>	800 (720 enclosed)
<b>IEC Make-Break Capability—AC4 (Amperes)</b>	
Make	8000
Break	6400

#### Product Specifications

##### 7.2 kV/800A

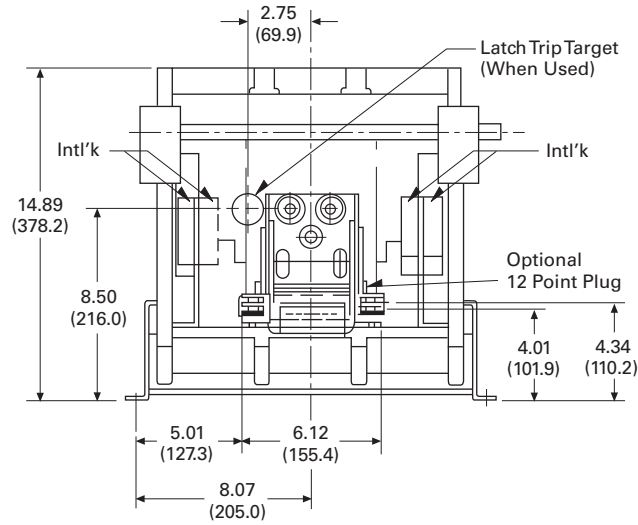
- Short-time current
  - 30 seconds: 4320A
  - 1 second: 10,800A
  - 8.7 ms (0.5 cycle) 86 kA peak
- Normal service altitude: –3281 to +6562 ft (–1000 to +2000m)
- Mechanical life: 1 million
- Electrical life: 100,000 operations
- BIL (impulse withstand): 60 kV (1.2 x 50 microseconds)
- Dielectric strength: 18.2 kV rms (1 minute)
- Closing time (energization to contact touch): 80 milliseconds
- Opening times (de-energization to full open):
  - 130 ms (8 cycles)
  - 200 ms (12 cycles)
  - 330 ms (20 cycles)
- Arcing time: 12 ms (0.75 cycle) or less
- Pickup voltage: 80% rated coil voltage
- Dropout voltage: 60% rated coil voltage
- Control voltages:
  - AC/Hz: 110/50, 120/60 Vac, 220/50, 240/60
  - DC: 125 Vdc
- Control circuit burden:
  - Closing (120/240): 2600 VA
  - Holding (120/240): 50 VA
- Auxiliary contact rating:
  - 600V (maximum)
  - 10A continuous current
  - Making capacity
    - AC: 7200 VA
    - DC: 200 VA
  - Breaking capacity
    - AC: 720 VA
    - DC: 200 VA
- Latch (when specified):
  - Mechanical life: 250,000 operations
  - Trip voltage
    - DC: 24, 48, 96V
    - AC: 110/120, 220/240V 50/60 Hz
  - Minimum trip voltage: 80% rated coil voltage
  - Trip burden
    - 24 Vdc: 1200 VA
    - 48 and 96 Vdc: 400 VA
    - 110 and 220 Vac: 500 VA
  - Trip time (2 cycles): 30 milliseconds
- Weight: 95 lbs (43.1 kg)

**Dimensions**

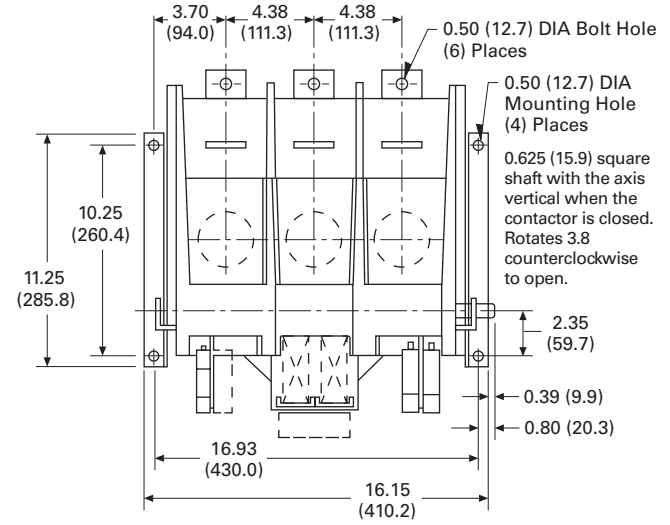
Approximate Dimensions in Inches (mm)

**Dimensional Drawings 7.2 kV/800A**

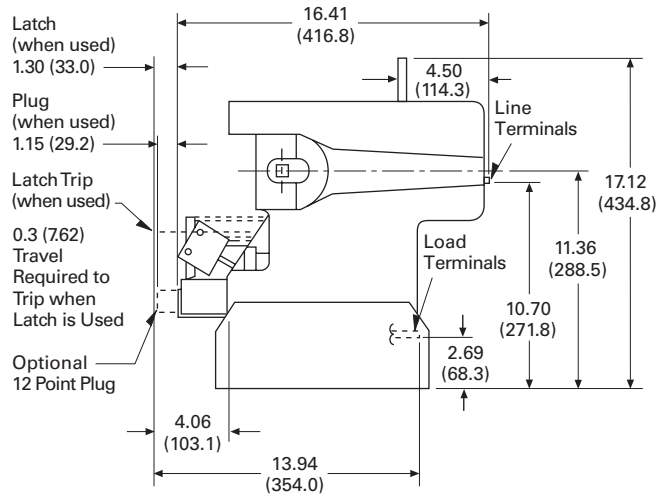
**Side**



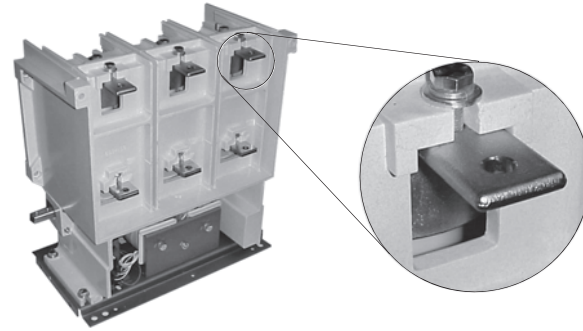
**Top**



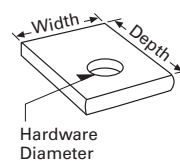
**Front**



**Lug Terminal**



**Lug Terminal**



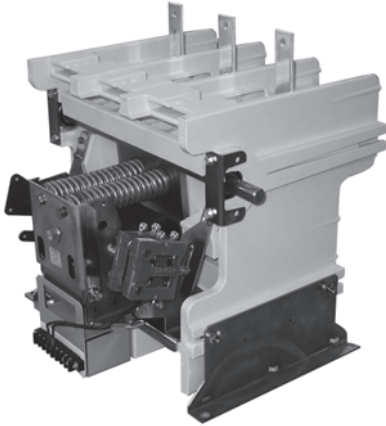
**Upper Lug Terminal**

Contactor Ampere Rating	Width	Depth	Hardware (Bolt Diameter)
7.2 kV/800	1.75 (44.5)	2.00 (50.8)	10

**Lower Lug Terminal**

Contactor Ampere Rating	Width	Depth	Hardware (Bolt Diameter)
7.2 kV/800	1.50 (38.1)	1.50 (38.1)	10

SL 15 kV/250A Medium Voltage Contactor



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### SL MV Power Contactor 15 kV/250A

#### Product Description

- A single family of contactors for any medium voltage control application. Voltage range of 7200–15,000V
- 250A rating with induction motor horsepower ranges from 500–5000 hp
- Two different altitude versions
- Leading-edge vacuum technology
- Long life—250,000 electrical and mechanical operations
- Special ordering allows unit to be factory pre-set to customer specification, including field kit installation
- Highest quality available—all contactors manufactured within state-of-the-art “ISO-Certified” facilities. 100% made in America

#### Application Description

##### *Eaton’s SL Medium Voltage Contactors starting applications:*

- Squirrel-cage induction motors
- Synchronous motors
- Wound-rotor

##### *Fully applicable to:*

- Full voltage starting
- Reduced voltage starting

##### *The perfect choice for harsh duty applications:*

- Mining
- Pulp and paper
- HVAC
- Petrochemical
- Automotive
- Many others

#### Features, Benefits and Functions

##### *Factory Installed Option Kit*

- Mechanical latch—many coil voltages

##### *Long Life Guarantees High Quality*

- 250,000 electrical operations
- 250,000 mechanical operations

#### Standards and Certifications

##### *Acceptability*

- NEMA
- ANSI
- IEC

##### *Third-Party Verification*

- UL
- CSA
- KEMA

##### *Design and Test Standards*

- UL 347, File No. E63257
- CSA T.I.L. D-21, File No. LR28548
- ANSI/NEMA ICS 3
- IEC 60470

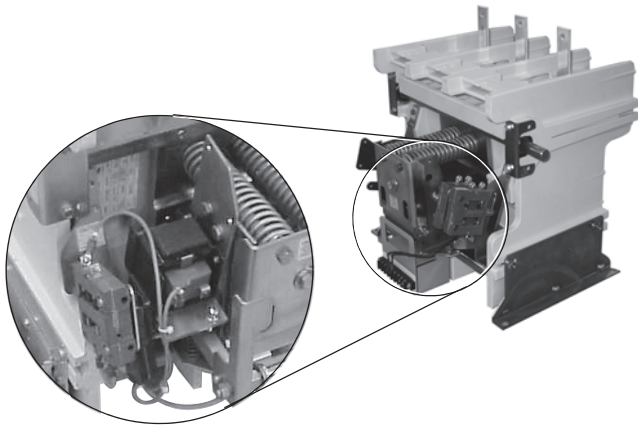


#### Product Selection

Contact Eaton for pricing.

**Options and Accessories**

**SL Series—Accessory Options 15 kV/250A**



**Mechanical Latch Assembly 15 kV/250A**

**Mechanical Latch Option—SL Vacuum Contactor**

Factory installed for 15 kV/250A SL Vacuum Contactor. Coil voltages available in a wide range of AC and DC selections.

**Technical Data and Specifications**

**The SL Contactor Ratings**

- Voltages to 15,000V
- 250A
- Interrupting rating of 5000A

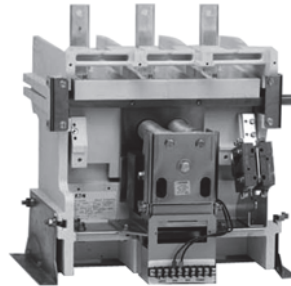
**Control Voltages**

- 110, 220 Vac, 50 Hz
- 120, 240 Vac, 60 Hz
- 125 Vdc

**Dropout Time**

- 50–330 ms
- Field selectable

**Front and Rear View 15 kV/250A**



**Front View**



**Rear View**

**SL Series Fuses**

**Fuse Application Table for SL Contactors 15 kV/SL-250A**

Motor FLA	Voltage	Suggested Eaton Fuse	Rating	Minimum Opening Time
50–200 ①	10,000–13,800	15HLE-250E	250E	130

**Notes**

① For FLA > 150, contact factory for maximum acceleration time.  
Fuse selections based on LRC = FLA x 6 with acceleration time of 10 seconds except where otherwise noted.

# 3.2

## Power Breakers, Contactors and Fuses

### Medium Voltage Power Contactors

#### SL Series Ratings

#### Type SL Vacuum Contactor Ratings 15 kV/250A

Rated Utilization Voltage	Interrupting Rating		Application Table					Maximum Insulation Voltage
	NEMA Unfused (E1) kA	NEMA Fused (E2) kA	Induction Motor Horsepower	Synchronous Motor Horsepower (0.8 PF) (1.0 PF)		Transformer kVA	Capacitor kVAR	
10,000–11,000	5	50 (950 MVA at 11,000V)	4000	4000	4500	3800	Consult factory	15,000
12,400–13,800	5	50 (1190 MVA at 13,800V)	5000	5000	5500	4750	Consult factory	15,000

#### Rating Specifications 15 kV/250A

Amperage Rating	15 kV/250A
<b>Maximum Interrupting Current</b> (Three operations—amperes)	5000
<b>Rated Current</b>	250
<b>IEC Make-Break Capability—AC4 (Amperes)</b>	
Make	2500
Break	2000

#### Product Specifications

##### 15kV/250A

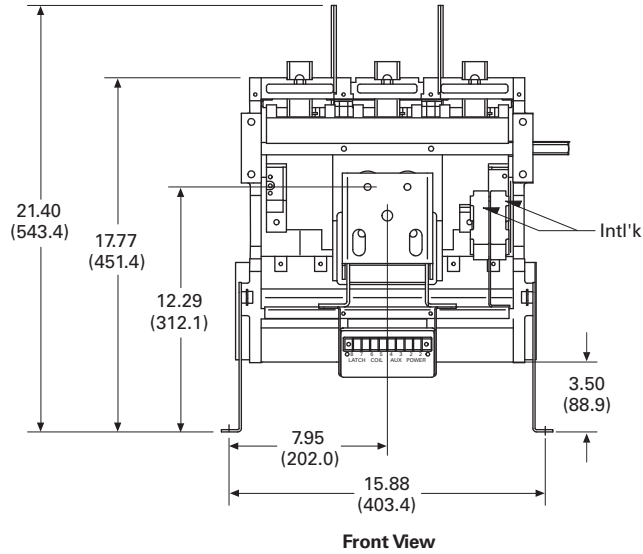
- Short-time current
  - 30 seconds: 1500A
  - 1 second: 3750A
  - 8.7 ms (0.5 cycle) 25 kA peak
- Normal service altitude: –3281 to +6562 ft (–1000 to +2000m)
- Mechanical life: 250,000 operations
- Electrical life: 250,000 operations
- BIL (impulse withstand): 75 kV (1.2 x 50 microseconds)
- Dielectric strength: 36 kV rms (1 minute)
- Closing time (energization to contact touch): 80 milliseconds
- Selectable opening times (de-energization to full open):
  - 50 ms (3 cycles)
  - 130 ms (8 cycles)
  - 250 ms (12 cycles)
  - 330 ms (20 cycles)
- Arcing time: 12 ms (0.75 cycle) or less
- Pickup voltage: 80% rated coil voltage
- Dropout voltage: 60% rated coil voltage
- Control voltages:
  - AC/Hz: 110/50, 120/60 Vac, 220/50, 240/60
  - DC: 125 Vdc
- Control circuit burden:
  - Closing (120/240): 1700/2600 VA
  - Holding (120/240): 80 VA
- Auxiliary contact rating:
  - 600V (maximum)
  - 10A continuous current
- Making capacity
  - AC: 7200 VA
  - DC: 200 VA
- Breaking capacity
  - AC: 720 VA
  - DC: 200 VA
- Latch (when specified):
  - Mechanical life: 250,000 operations
  - Trip voltage
    - DC: 24, 48, 96V
    - AC: 110/120, 220/240V, 50/60 Hz
  - Minimum trip voltage: 80% rated coil voltage
  - Trip burden
    - 24 Vdc: 1200 VA
    - 48 and 96 Vdc: 400 VA
    - 110 and 220 Vac: 500 VA
  - Trip time (2 cycles): 30 milliseconds
- Weight: 95 lbs (43.1 kg)

**Dimensions**

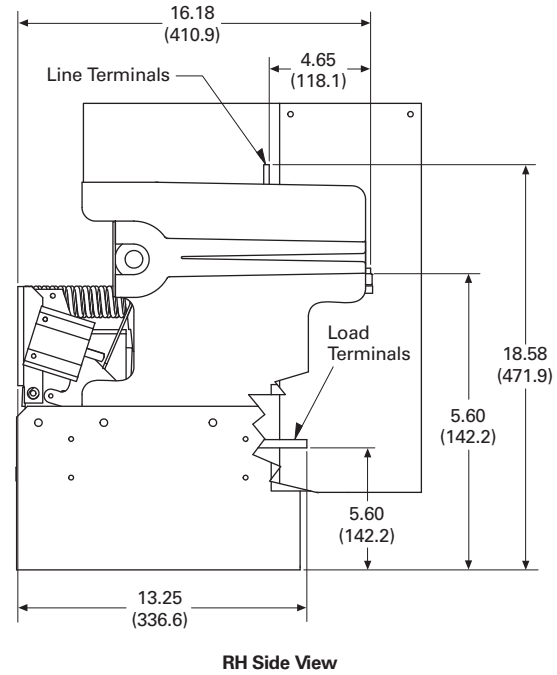
Approximate Dimensions in Inches (mm)

**Dimensional Drawings 15 kV/250A**

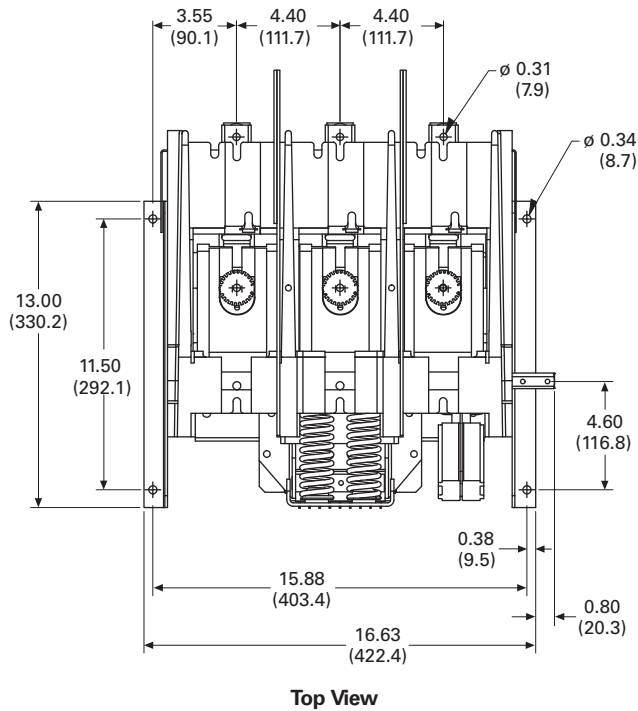
**Front**



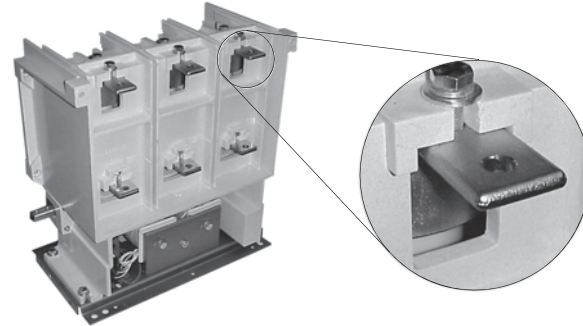
**Side 15 kV/250A**



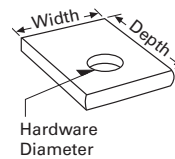
**Top**



**Lug Terminal**



**Lug Terminal**



**Upper Lug Terminal**

Contactor Ampere Rating	Width	Depth	Hardware (Bolt Diameter)
15 kV/250	1.25 (31.8)	1.25 (31.8)	10

**Lower Lug Terminal**

Contactor Ampere Rating	Width	Depth	Hardware (Bolt Diameter)
15 kV/250	1.50 (38.1)	1.25 (38.1)	10

**Contents****Description**

Fuses General

**Product Overview****Power Fuse**

Eaton's roots in the medium voltage power fuse business began over 75 years ago under Westinghouse® Electric. In 1935, Westinghouse introduced the medium voltage boric acid expulsion fuse followed by the medium voltage current limiting fuse. Even today, medium voltage fuses continue to use that core technology. Eaton continues to build on the technology legacy by engineering higher performance, cost-effective power fuse products.

Eaton's medium voltage fuses are manufactured and tested to the requirements of the C37-4X series of standards, which are maintained and updated regularly to maintain currency with industry practices. These standards are:

**IEEE Std. C37.40™**

IEEE Standard Service Conditions and Definitions for High Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Accessories (ANSI).

**IEEE Std. C37.41™**

IEEE Standard Design Tests for High-Voltage (>1000V) Fuses, Fuse and Disconnecting Cutouts, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Fuse Links and Accessories used with These Devices (ANSI).

**ANSI C37.42™**

IEEE Standard Specifications for High-Voltage (>1000V) Expulsion-Type Distribution-Class Fuses, Fuse and Disconnecting Cutouts, Fuse Disconnecting Switches, and Fuse Links, and Accessories used with These Devices (ANSI).

**ANSI C37.46**

American National Standard for High Voltage Expulsion and Current Limiting Type Power Class Fuses and Fuse Disconnecting Switches.

**ANSI C37.47**

American National Standard for High Voltage Current Limiting Type Distribution Class Fuses and Fuse Disconnecting Switches.

The following IEEE standards are also applicable to the fuse products covered in this publication:

**IEEE Std. C37.48™**

IEEE Guide for the Application, Operation, and Maintenance of High Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Accessories (ANSI).

**IEEE Std. C37.48.1™**

IEEE Guide for the Classification, Application, and Coordination of Current-Limiting Fuses with Rated Voltages 1–38 kV.

A better understanding of some fuse terminology will help you understand and select the correct fuse. The following is a brief overview of those terms.

**Power vs. Distribution**

The differentiation is intended to indicate the test conditions and where fuses are normally applied on an electrical system, based on specific requirements for generating sources, substations and distribution lines. Each class has its own unique set of voltage, current and construction requirements (see C37.42, .46 and .47).

**Low vs. Medium vs. High Voltage**

While fuses are defined in the ANSI standards as either low or high voltage, Eaton has elected to name their fuses to correspond with the equipment in which they are installed. Therefore, per ANSI C84, our fuses are named as follows:

- Low voltage—1000V and below
- Medium voltage—greater than 1000 to 69,000V
- High voltage—greater than 69,000V

**Expulsion vs. Current Limiting (Definitions per ANSI C47.40-1993)**

An expulsion fuse is a vented fuse in which the expulsion effect of the gases produced by internal arcing, either alone or aided by other mechanisms, results in current interruption.

An expulsion fuse is not current limiting and as a result limits the duration of a fault on the electrical system, not the magnitude.

A current limiting fuse is a fuse that, when its current responsive element is melted by a current within the fuse's specified current limiting range, abruptly introduces a high resistance to reduce current magnitude and duration, resulting in subsequent current interruption. Refer to Fuse Types Protection Range figure on **Page V4-T3-72** for a features comparison.

**Fuse Types**

There are three current limiting fuse types: Backup, General Purpose and Full Range. It is important that the user have an understanding of these definitions to ensure proper application of the fuse (see Fuse Types Protection Range figure on **Page V4-T3-72**).

**Backup Fuses**

A fuse capable of interrupting all currents from the maximum rated interrupting current down to the rated minimum interrupting current.

Backup fuses are always used in a series with another interrupting device capable of interrupting currents below the fuse's minimum interrupting current.

**General Purpose Fuses**

A fuse capable of interrupting all currents from the rated interrupting current down to the current that causes melting of the fusible element in no less than one hour.

General Purpose fuses are typically used to protect feeders and components such as transformers.

**Full Range Fuses**

A fuse capable of interrupting all currents from the rated interrupting current down to the minimum continuous current that causes melting of the fusible element, with the fuse applied at the maximum ambient temperature specified by the manufacturer.

**General Fuse Component Terms****Fuse Refill Unit (of an Expulsion Fuse)**

A fuse refill unit is a replaceable assembly containing the calibrated current-responsive fuse element and certain other items that facilitate current interruption. On its own, the refill unit has no interrupting ability. A refill unit must be mounted in a fuseholder with a spring assembly to form a refillable fuse unit. The refill unit is the section of the fuse that must be replaced after a fuse operation.

**Fuseholder (of an Expulsion Fuse)**

A fuseholder is a reusable holder that when equipped with a fuse refill unit forms a fuse unit, capable of interrupting an overload or fault current. A fuseholder is supplied with a spring and shunt assembly, necessary to complete the internal interrupting assembly. The spring and shunt assembly is supplied with the fuseholder but is also available as a replacement part, as it may need replacement after several of heavy operations.

**Fuse Unit**

A fuse unit is a replaceable unit or assembly that is able, on its own, to perform current interruption. In the case of a refillable fuse unit, the refill unit must be replaced after a fuse operation. Where a complete fuse unit is supplied from the factory, the complete fuse unit must be replaced after a fuse operation. All current-limiting fuses are fuse units.

**Exhaust Control Device**

When expulsion fuses are used in enclosures, exhaust control devices (filters, condensers or mufflers) are used to control the sound of the fuse operation, and to de-ionize and absorb the fuse exhaust products. These devices are normally supplied separately, because of different characteristics and ratings. They are reusable but may need replacement after several heavy operations.

**Mounting**

A mounting provides all the necessary parts to safely mount a fuse in its intended piece of equipment. The base is the metal support to which all other pieces attach. Insulators attach to the base and insulate the live fuse unit from the base and everything beyond the base. Live parts are the parts of the mounting that are energized once electricity is flowing. The live parts provide the means to hold the fuse unit in place, electrical contact, and a place to make line and load connections.

**Non-Disconnect Mounting**

A non-disconnect mounting does not provide a means for removing the fuse unit until the circuit is dead and the fuse unit can be removed manually. The fuse unit is held in place by friction through the use of fuse clips or by a cross bar.



# 3.3

## Power Breakers, Contactors and Fuses

### Fuses General

3

#### Disconnect Mounting

The disconnect mounting allows the fuse unit to be removed (off load) using an insulated hook stick. The hookstick grabs a pull ring and disconnects the fuse unit, which may then be lifted out of its mounting.

#### Dropout Mounting

Dropout mountings are used in outdoor applications. The fuse unit is equipped with a mechanical trigger that unlatches the upper contact, allowing the fuse unit to drop out, increasing the dielectric separation, and providing visible indication of a blown fuse.

#### Live Parts

Live parts were briefly discussed as part of the "Mounting" definition. Everything above the insulators on the mounting excluding the fuse unit, fuse holder, and the fuse end fittings (if required) are considered the live parts. Fuse end fittings are discussed next and are not required with non-disconnect live parts, but are required and included with disconnect live parts. Live parts may be sold separately as replacement parts or for new OEM applications.

#### End Fittings

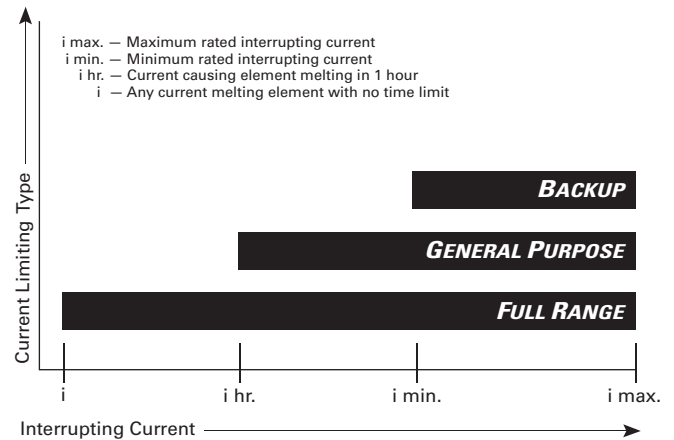
End fittings are metal parts that attach to each end of a fuse unit's ferrules (end caps). As previously mentioned, they are used solely with disconnect fuse applications or when converting a non-disconnect to a disconnect fuse configuration.

When end fittings are ordered, a fitting for each end of the fuse is included. Keep in mind that end fittings can become damaged in use and, therefore, are sold separately from the live parts when necessary. It is not necessary to purchase an entire set of live parts when only the end fittings are required.

#### General High Voltage Fuse Comparison

Expulsion	Current Limiting
Vented	Sealed
Electromechanical	Static
Interrupts at current zero	Limits fault current
Generally higher voltage and current application capabilities	Generally higher interrupting ratings
Different time/current characteristics	Different time/current characteristics

#### Fuse Types Protection Range



**Contents**

**Description**

Catalog Number Selection . . . . .

Product Selection . . . . .

**Page**

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**V4-T3-75**

**Product Description**

Eaton’s expulsion fuses use boric acid as the interrupting medium. Under a fault condition, arc heat decomposes the boric acid into water vapor. The water vapor blast deionizes the arc path preventing arc re-ignition after a natural current zero.

Type RBA indoor expulsion fuses must be fitted with a discharge filter or condenser, that moderates the discharge exhaust. The discharge filter limits the exhaust to a small and relatively inert amount of gas and lowers the noise level without affecting the fuse interrupting rating. Steam discharge, that can effect the interrupting, is fully restricted by the condenser.

Type RDB outdoor dropout fuses include an ejector spring that forces the arcing rod through the top of the fuse. The arcing rod strikes a latch on the mounting that forces the fuse to swing outward through a 180° arc into the dropout position.

Refill units can be field installed into RBA and RDB expulsion fuses. Once the operated unit has been removed, the separately purchased unit can be easily installed into the fuse holder.

Type DBU fuse units are designed for new and aftermarket utility applications. End fittings are available, in both indoor and outdoor versions, as well as live parts and mountings. Mufflers confine the arc within the fuse and substantially reduce the noise and exhaust when the fuse interrupts.



**RBA E-Rated Refillable Boric Acid**



**RDB E-Rated Refillable Outdoor Dropout Boric Acid**



**DBU Dropout Boric Acid—for Use Indoors, Inside Switchgear or Outdoors**

**Accessories**

The following accessories are available for expulsion fuses:

**Mountings**

Mountings include a base, porcelain or glass polyester insulators, and live parts. They help enable the fuse to be safely attached to the gear. Mountings can be either disconnect, nondisconnect or dropout. Non-disconnect mountings are available in bolt-on or clamp-type arrangements. Fuses may be vertical or underhung.

**Live Parts**

Live parts attach the fuse to the insulators and are considered part of the mounting. All parts above the insulators are live parts.

**End Fittings**

End fittings are metal parts that attach to each end of the fuse at the ferrules. They are used only on disconnect fuses or when converting a nondisconnect to a disconnect fuse.

# 3.4

## Power Breakers, Contactors and Fuses

### Expulsion Fuses

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#### Catalog Number Selection

##### Expulsion Fuse

##### Easy to Use, Easy to Order!

Eaton's fuse catalog numbering system makes it easy to order the right fuse. The catalog numbers are easy to remember, unique to each fuse, and are broken down in three descriptive segments: Fuse Type, Voltage Rating and Current Rating.

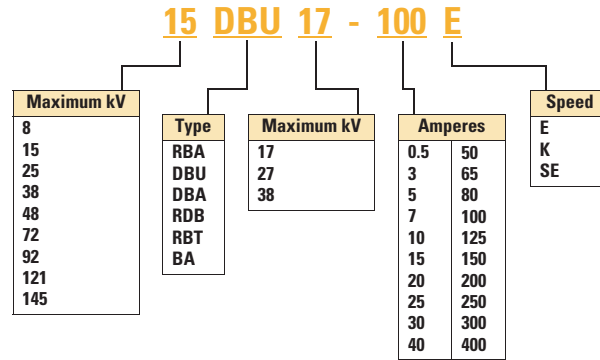
These Catalog numbers can be entered directly and easily:

- No change in order processing will occur if you use either a style number or its corresponding catalog number. You will get the same fuse
- If you are ordering a replacement for an older Westinghouse fuse, it will only have the style number. Order under this style number and you will get the correct fuse

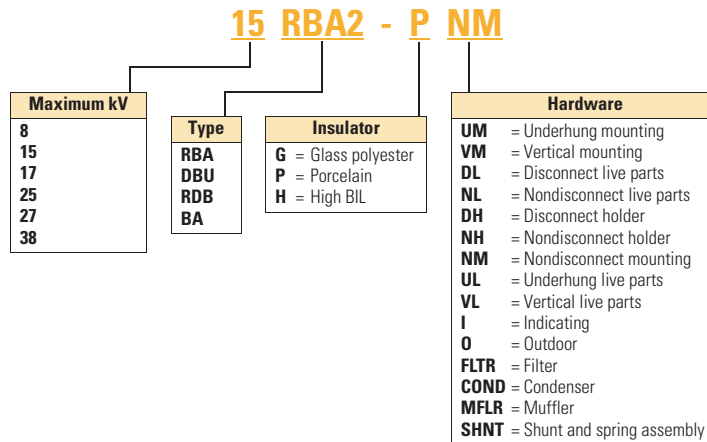
##### Examples:

8RBA2-10E	8.3 max. kV, RBA-200 refill, 10E amperes
DBU17-30K	17.1 max. kV, DBU fuse unit, 30 amperes
15RBA8-INH	15.5 max. kV, RBA-800, indicating nondisconnect holder
RBA4-FLTR	RBA-400 filter

#### Expulsion Fuse Units



#### Expulsion Fuse Accessories



**Product Selection**

Contact Eaton for pricing.

**Type RBA and RDB**

**Type 8RBA2 Expulsion Fuse Refill Units—8.3 kV Maximum (7.2 kV Nominal) 200A**

**RBA/RBT Refill Units**

Ampere Rating	Standard Speed (Fuse Refills)		Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
	Catalog Number	Curve Reference 36-635	Catalog Number	Curve Reference 36-635	
10E	8RBA2-10E	1, 2	—	—	1.0 (0.45)
15E	8RBA2-15E	1, 2	—	—	1.0 (0.45)
20E	8RBA2-20E	1, 2	8RBT2-20E	3, 4	1.0 (0.45)
25E	8RBA2-25E	1, 2	8RBT2-25E	3, 4	1.0 (0.45)
30E	8RBA2-30E	1, 2	8RBT2-30E	3, 4	1.0 (0.45)
40E	8RBA2-40E	1, 2	8RBT2-40E	3, 4	1.0 (0.45)
50E	8RBA2-50E	1, 2	8RBT2-50E	3, 4	1.0 (0.45)
65E	8RBA2-65E	1, 2	8RBT2-65E	3, 4	1.0 (0.45)
80E	8RBA2-80E	1, 2	8RBT2-80E	3, 4	1.0 (0.45)
100E	8RBA2-100E	1, 2	8RBT2-100E	3, 4	1.0 (0.45)
125E	8RBA2-125E	1, 2	8RBT2-125E	3, 4	1.0 (0.45)
150E	8RBA2-150E	1, 2	8RBT2-150E	3, 4	1.0 (0.45)
200E	8RBA2-200E	1, 2	8RBT2-200E	3, 4	1.0 (0.45)

**Type RBA Expulsion Fuses for Use Indoors or in an Enclosure—8.3 kV Maximum (7.2 kV Nominal) 200A (For Use with 8RBA2 Fuseholders) ①**

**RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Indoor or Enclosure Applications)**

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers	Spring and Shunt Assy.
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum		Porcelain Insulator	Glass Polyester			
10E–200E	Non-disconnect	8RBA2-NH	8RBA2-INH	4.8	5.5	60	5RBA2-PNM	5RBA2-GNM	15RBA2-NL	RBA2-FLTR RBA2-COND	8RBA2-SHNT
				7.2	8.3	75	8RBA2-PNM	8RBA2-GNM			
	Disconnect	8RBA2-DH	8RBA2-IDH	4.8	5.5	60	5RBA2-PDM	5RBA2-GDM	14RBA2-DL	RBA2-FLTR RBA2-COND	8RBA2-SHNT
				7.2	8.3	75	8RBA2-PDM	8RBA2-GDM			
	Bolt-in	—	8RBA2-INH-B	4.8	5.5	60	5RBA8-PNM	5RBA8-GNM	15RBA8-NL	RBA2-FLTR RBA2-COND	8RBA2-SHNT
				7.2	8.3	75	8RBA8-PNM	8RBA8-GNM			
Bolt-in	—	8RBA2-INH-B	7.2	8.3	75	8RBA8-PNM	8RBA8-GNM	15RBA8-NL	RBA2-FLTR RBA2-COND	8RBA2-SHNT	

**Type RDB Expulsion Fuses for Use Outdoors—8.3 kV Maximum (7.2 kV Nominal) 200A ②**

**RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Outdoor Applications)**

Ampere Rating	Style	Fuseholder Catalog Number	Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.	
			Nominal	Maximum		Vertical (180°) Mounting	Underhung (90°) Mounting			
10E–200E	Dropout	8RDB2-DH	7.2	8.3	95	8RDB2-VM	8RDB2-UM	RDB2-VL	RDB2-UL	8RDB2-SHNT
						8RDB2-HVM	8RDB2-HUM			

**Notes**

- ① For new installation, order one refill (Standard Speed or Time Lag), one fuseholder, one mounting, and one filter or condenser per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ② For new installation, order one refill (Standard Speed or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.

# 3.4

## Power Breakers, Contactors and Fuses

### Expulsion Fuses

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#### Type 8RBA4 Expulsion Fuse Refill Units—8.3 kV Maximum (7.2 kV Nominal) 400A

##### RBA/RBT Refill Units

Ampere Rating	Standard Speed (Fuse Refills)		Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
	Catalog Number	Curve Reference 36-635	Catalog Number	Curve Reference 36-635	
0.5	8RBA4-5	5, 6	—	—	2.1 (0.95)
3	8RBA4-3	5, 6	—	—	2.1 (0.95)
5E	8RBA4-5E	5, 6	—	—	2.1 (0.95)
7E	8RBA4-7E	5, 6	—	—	2.1 (0.95)
10E	8RBA4-10E	5, 6	—	—	2.1 (0.95)
15E	8RBA4-15E	5, 6	—	—	2.1 (0.95)
20E	8RBA4-20E	5, 6	8RBT4-20E	7, 8	2.1 (0.95)
25E	8RBA4-25E	5, 6	8RBT4-25E	7, 8	2.1 (0.95)
30E	8RBA4-30E	5, 6	8RBT4-30E	7, 8	2.1 (0.95)
40E	8RBA4-40E	5, 6	8RBT4-40E	7, 8	2.1 (0.95)
50E	8RBA4-50E	5, 6	8RBT4-50E	7, 8	2.1 (0.95)
65E	8RBA4-65E	5, 6	8RBT4-65E	7, 8	2.1 (0.95)
80E	8RBA4-80E	5, 6	8RBT4-80E	7, 8	2.1 (0.95)
100E	8RBA4-100E	5, 6	8RBT4-100E	7, 8	2.1 (0.95)
125E	8RBA4-125E	5, 6	8RBT4-125E	7, 8	2.1 (0.95)
150E	8RBA4-150E	5, 6	8RBT4-150E	7, 8	2.1 (0.95)
200E	8RBA4-200E	5, 6	8RBT4-200E	7, 8	2.1 (0.95)
250E	8RBA4-250E	5, 6	8RBT4-250E	10, 11	2.1 (0.95)
300E	8RBA4-300E	5, 6	8RBT4-300E	10, 11	2.1 (0.95)
400E	8RBA4-400E	5, 6	8RBT4-400E	10, 11	2.1 (0.95)

#### Type RBA Expulsion Fuses for Use Indoors or in an Enclosure—8.3 kV Maximum (7.2 kV Nominal) 400A (For Use with 8RBA4 Fuseholders) ①

##### RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Indoor or Enclosure Applications)

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers	Spring and Shunt Assy.	
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum		Porcelain Insulator	Glass Polyester				
0.5–400E	Non-disconnect	8RBA4-NH	8RBA4-INH	4.8	5.5	60	5RBA4-PNM	5RBA4-GNM	15RBA4-NL	RBA4-FLTR RBA4-COND	8RBA4-SHNT	
	Non-disconnect	8RBA4-NH	8RBA4-INH	7.2	8.3	75	8RBA4-PNM	8RBA4-GNM	15RBA4-NL	RBA4-FLTR RBA4-COND	8RBA4-SHNT	
	Disconnect	8RBA4-DH	8RBA2-IDH	4.8	5.5	60	5RBA4-PDM	5RBA4-GDM	14RBA4-DL	RBA4-FLTR RBA4-COND	8RBA4-SHNT	
	Disconnect	8RBA4-DH	8RBA2-IDH	7.2	8.3	75	8RBA4-PDM	8RBA4-GDM	14RBA4-DL	RBA4-FLTR RBA4-COND	8RBA4-SHNT	
	Bolt-in	—	—	8RBA2-INH-B	4.8	5.5	60	5RBA8-PNM	5RBA8-GNM	15RBA8-NL	RBA4-FLTR RBA4-COND	8RBA4-SHNT
	Bolt-in	—	—	8RBA4-INH-B	7.2	8.3	75	8RBA8-PNM	8RBA8-GNM	15RBA8-NL	RBA4-FLTR RBA4-COND	8RBA4-SHNT

#### Type RDB Expulsion Fuses for Use Outdoors—8.3 kV Maximum (7.2 kV Nominal) 400A ②

##### RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Outdoor Applications)

Ampere Rating	Style	Fuseholder Catalog Number	Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.	
			Nominal	Maximum		Vertical (180°) Mounting	Underhung (90°) Mounting			
0.5–400E	Dropout	8RDB4-DH	7.2	8.3	95	8RDB4-VM	8RDB4-UM	RDB4-VL	RDB4-UL	8RDB4-SHNT
	Dropout	8RDB4-DH	7.2	8.3	110	8RDB4-HVM	8RDB4-HUM	RDB4-VL	RDB4-UL	8RDB4-SHNT

##### Notes

- ① For new installation, order one refill (Standard Speed or Time Lag), one fuseholder, one mounting, and one filter or condenser per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ② For new installation, order one refill (Standard Speed or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.

**Type 8RBA4 Expulsion Fuse Refill Units Used in 8RBA8/8RDB4 Fuseholders—  
8.3 kV Maximum (7.2 kV Nominal) 800A**

**RBA/RBT Refill Units**

Ampere Rating	Quantity	Standard Speed (Fuse Refills)		Quantity	Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
		Catalog Number	Curve Reference 36-635		Catalog Number	Curve Reference 36-635	
450E	2	8RBA4-250E	9	2	8RBT4-250E	12	①
540E	2	8RBA4-300E	9	2	8RBT4-300E	12	①
720E	2	8RBA4-400E	9	2	8RBT4-400E	12	①

**Type RBA Expulsion Fuses for Use Indoors or in an Enclosure—  
8.3 kV Maximum (7.2 kV Nominal) 800A (For Use with 8RBA8 Fuseholders) ②**

**RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Indoor or Enclosure Applications)**

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers	Spring and Shunt Assy.
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum		Porcelain Insulator	Glass Polyester			
		Catalog Number	Catalog Number	Catalog Number	Catalog Number		Catalog Number	Catalog Number			
450E–720E	Non-disconnect	8RBA8-NH	8RBA8-INH	4.8	5.5	60	8RBA8-PNM	8RBA8-GNM	15RBA8-NL	RBA4-FLTR ③	8RBA4-SHNT
	Non-disconnect	8RBA8-NH	8RBA8-INH	7.2	8.3	75	8RBA8-PNM	8RBA8-GNM	15RBA8-NL	RBA4-FLTR ③	8RBA4-SHNT
										RBA4-COND ③	

**Type RDB Expulsion Fuses for Use Outdoors—8.3 kV Maximum (7.2 kV Nominal) 800A ④**

**RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Outdoor Applications)**

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.	
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum		Vertical (180°) Mounting	Underhung (90°) Mounting			
		Catalog Number	Catalog Number	Catalog Number	Catalog Number		Catalog Number	Catalog Number			
450E–720E	Disconnect	8RDB4-NH	8RDB4-INH	7.2	8.3	95	8RDB8-VM	8RDB8-UM	RDB8-VL	RDB8-UL	8RDB4-SHNT
	Disconnect	8RDB4-NH	8RDB4-INH	7.2	8.3	110	8RDB8-HVM	8RDB8-HUM	RDB8-VL	RDB8-UL	8RDB4-SHNT

**Notes**

- ① Requires two fuse refills as shown. Price each refill individually. Example: To order refill units for a 720E, 8.3 kV fuse, order two pieces of an 8RBA4-400E.
- ② For new installation, order two refills (Standard or Time Lag), one fuseholder, one mounting, and two filters or condensers per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ③ Two filters or condensers required.
- ④ For new installation, order two refills (Standard or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.

# 3.4

## Power Breakers, Contactors and Fuses

### Expulsion Fuses

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#### Type 15RBA2 Expulsion Fuse Refill Units— 15.5 kV Maximum (14.4 kV Nominal) 200A

##### RBA/RBT Refill Units

Ampere Rating	Standard Speed (Fuse Refills)		Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
	Catalog Number	Curve Reference 36-635	Catalog Number	Curve Reference 36-635	
10E	15RBA2-10E	1, 2	—	—	1.1 (0.5)
15E	15RBA2-15E	1, 2	—	—	1.1 (0.5)
20E	15RBA2-20E	1, 2	15RBT2-20E	3, 4	1.1 (0.5)
25E	15RBA2-25E	1, 2	15RBT2-25E	3, 4	1.1 (0.5)
30E	15RBA2-30E	1, 2	15RBT2-30E	3, 4	1.1 (0.5)
40E	15RBA2-40E	1, 2	15RBT2-40E	3, 4	1.1 (0.5)
50E	15RBA2-50E	1, 2	15RBT2-50E	3, 4	1.1 (0.5)
65E	15RBA2-65E	1, 2	15RBT2-65E	3, 4	1.1 (0.5)
80E	15RBA2-80E	1, 2	15RBT2-80E	3, 4	1.1 (0.5)
100E	15RBA2-100E	1, 2	15RBT2-100E	3, 4	1.1 (0.5)
125E	15RBA2-125E	1, 2	15RBT2-125E	3, 4	1.1 (0.5)
150E	15RBA2-150E	1, 2	15RBT2-150E	3, 4	1.1 (0.5)
200E	15RBA2-200E	1, 2	15RBT2-200E	3, 4	1.1 (0.5)

#### Type RBA Expulsion Fuses for Use Outdoors— 15.5 kV Maximum (14.4 kV Nominal) 200A (For Use with 15RBA2 Fuseholders) ①

##### RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Outdoor Applications)

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers	Spring and Shunt Assy.
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum		Porcelain Insulator	Glass Polyester			
10E–200E	Non-disconnect	15RBA2-NH	15RBA2-INH	13.8	15.5	95	14RBA2-PNM	14RBA2-GNM	15RBA2-NL	RBA2-FLTR RBA2-COND	15RBA2-SHNT
	Non-disconnect	15RBA2-NH	15RBA2-INH	13.8	15.5	110	15RBA2-PNM	—	15RBA2-NL	RBA2-FLTR RBA2-COND	15RBA2-SHNT
	Disconnect	15RBA2-DH	15RBA2-IDH	13.8	15.5	95	14RBA2-PDM	14RBA2-GDM	38RBA2-DL	RBA2-FLTR RBA2-COND	15RBA2-SHNT
	Disconnect	15RBA2-DH	15RBA2-IDH	13.8	15.5	110	15RBA2-PDM	—	38RBA2-DL	RBA2-FLTR RBA2-COND	15RBA2-SHNT
	Bolt-in	—	15RBA2-INH-B	13.8	15.5	95	14RBA8-PNM	14RBA8-GNM	15RBA8-NL	RBA2-FLTR RBA2-COND	15RBA2-SHNT
	Bolt-in	—	15RBA2-INH-B	13.8	15.5	110	15RBA8-PNM	15RBA8-GNM	15RBA8-NL	RBA2-FLTR RBA2-COND	15RBA2-SHNT

#### Type RDB Expulsion Fuses for Use Outdoors— 15.5 kV Maximum (14.4 kV Nominal) 200A ②

##### RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Outdoor Applications)

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.
		Catalog Number		Nominal	Maximum		Vertical (180°) Mounting	Underhung (90°) Mounting		
10E–200E	Dropout	15RDB2-DH		13.8	15.5	110	15RDB2-VM	15RDB2-UM	RDB2-VL	RDB2-UL 15RDB2-SHNT
	Dropout	15RDB2-DH		13.8	15.5	150	15RDB2-HVM	15RDB2-HUM	RDB2-VL	RDB2-UL 15RDB2-SHNT

##### Notes

- ① For new installation, order one refill (Standard Speed or Time Lag), one fuseholder, one mounting, and one filter or condenser per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ② For new installation, order one refill (Standard Speed or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.

**Type 15RBA4 Expulsion Fuse Refill Units— 15.5 kV Maximum (14.4 kV Nominal) 400A**

**RBA/RBT Refill Units**

Ampere Rating	Standard Speed (Fuse Refills)		Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
	Catalog Number	Curve Reference 36-635	Catalog Number	Curve Reference 36-635	
0.5	15RBA4-5	5, 6	—	—	2.3 (1.0)
3	15RBA4-3	5, 6	—	—	2.3 (1.0)
5E	15RBA4-5E	5, 6	—	—	2.3 (1.0)
7E	15RBA4-7E	5, 6	—	—	2.3 (1.0)
10E	15RBA4-10E	5, 6	—	—	2.3 (1.0)
15E	15RBA4-15E	5, 6	—	—	2.3 (1.0)
20E	15RBA4-20E	5, 6	15RBT4-20E	7, 8	2.3 (1.0)
25E	15RBA4-25E	5, 6	15RBT4-25E	7, 8	2.3 (1.0)
30E	15RBA4-30E	5, 6	15RBT4-30E	7, 8	2.3 (1.0)
40E	15RBA4-40E	5, 6	15RBT4-40E	7, 8	2.3 (1.0)
50E	15RBA4-50E	5, 6	15RBT4-50E	7, 8	2.3 (1.0)
65E	15RBA4-65E	5, 6	15RBT4-65E	7, 8	2.3 (1.0)
80E	15RBA4-80E	5, 6	15RBT4-80E	7, 8	2.3 (1.0)
100E	15RBA4-100E	5, 6	15RBT4-100E	7, 8	2.3 (1.0)
125E	15RBA4-125E	5, 6	15RBT4-125E	7, 8	2.3 (1.0)
150E	15RBA4-150E	5, 6	15RBT4-150E	7, 8	2.3 (1.0)
200E	15RBA4-200E	5, 6	15RBT4-200E	7, 8	2.3 (1.0)
250E	15RBA4-250E	5, 6	15RBT4-250E	10, 11	2.3 (1.0)
300E	15RBA4-300E	5, 6	15RBT4-300E	10, 11	2.3 (1.0)
400E	15RBA4-400E	5, 6	15RBT4-400E	10, 11	2.3 (1.0)

**Type RBA Expulsion Fuses for Use Outdoors— 15.5 kV Maximum (14.4 kV Nominal) 400A (For Use with 15RBA4 Fuseholders) ①**

**RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Outdoor Applications)**

Ampere Rating	Style	Fuseholder		Voltage (kV)			Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers	Spring and Shunt Assy.
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum	LIWL (BIL)	Porcelain Insulator Catalog Number	Glass Polyester Catalog Number			
0.5–400E	Non-disconnect	15RBA4-NH	15RBA4-INH	13.8	15.5	95	14RBA4-PNM	14RBA4-GNM	15RBA4-NL	RBA4-FLTR RBA4-COND	15RBA4-SHNT
	Non-disconnect	15RBA4-NH	15RBA4-INH	13.8	15.5	110	15RBA4-PNM	—	15RBA4-NL	RBA4-FLTR RBA4-COND	15RBA4-SHNT
	Disconnect	15RBA4-DH	15RBA2-IDH	13.8	15.5	95	14RBA4-PDM	14RBA4-GDM	15RBA4-DL	RBA4-FLTR RBA4-COND	15RBA4-SHNT
	Disconnect	15RBA4-DH	15RBA2-IDH	13.8	15.5	110	15RBA4-PDM	—	15RBA4-DL	RBA4-FLTR RBA4-COND	15RBA4-SHNT
	Bolt-in	—	15RBA4-INH-B	13.8	15.5	95	14RBA8-PNM	14RBA8-GNM	15RBA8-NL	RBA-FLTR RBA4-COND	15RBA4-SHNT
	Bolt-in	—	15RBA4-INH-B	13.8	15.5	110	15RBA8-PNM	15RBA8-GNM	15RBA8-NL	RBA-FLTR RBA4-COND	15RBA4-SHNT

**Type RDB Expulsion Fuses for Use Outdoors— 15.5 kV Maximum (14.4 kV Nominal) 400A ②**

**RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Outdoor Applications)**

Ampere Rating	Style	Fuseholder Catalog Number	Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.	
			Nominal	Maximum		Vertical (180°) Mounting Catalog Number	Underhung (90°) Mounting Catalog Number			
0.5–400E	Dropout	15RDB4-DH	13.8	15.5	110	15RDB4-VM	15RDB4-UM	RDB4-VL	RDB4-UL	15RDB4-SHNT
	Dropout	15RDB4-DH	13.8	15.5	150	15RDB4-HVM	15RDB4-HUM	RDB4-VL	RDB4-UL	15RDB4-SHNT

**Notes**

- ① For new installation, order one refill (Standard Speed or Time Lag), one fuseholder, one mounting, and one filter or condenser per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ② For new installation, order one refill (Standard Speed or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.



# 3.4

## Power Breakers, Contactors and Fuses

### Expulsion Fuses

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#### Type 15RBA4 Expulsion Fuse Refill Units Used in 15RBA8/15RDB4 Fuseholders— 15.5 kV Maximum (14.4 kV Nominal) 800A

##### RBA/RBT Refill Units

Ampere Rating	Quantity	Standard Speed (Fuse Refills)		Quantity	Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
		Catalog Number	Curve Reference 36-635		Catalog Number	Curve Reference 36-635	
450E	2	15RBA4-250E	9	2	15RBT4-250E	12	①
540E	2	15RBA4-300E	9	2	15RBT4-300E	12	①
720E	2	15RBA4-400E	9	2	15RBT4-400E	12	①

#### Type RBA Expulsion Fuses for Use Outdoors— 15.5 kV Maximum (14.4 kV Nominal) 800A (For Use with 15RBA8 Fuseholders) ②

##### RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Outdoor Applications)

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers	Spring and Shunt Assy.
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum		Porcelain Insulator Catalog Number	Glass Polyester Catalog Number			
450E–720E	Non-disconnect	15RBA8-NH	15RBA8-INH	13.8	15.5	95	14RBA8-PNM	14RBA8-GNM	15RBA8-NL	RBA4-FLTR ③	15RBA4-SHNT
										RBA4-COND ③	
	Non-disconnect	15RBA8-NH	15RBA8-INH	13.8	15.5	110	15RBA8-PNM	14RBA8-GNM	15RBA8-NL	RBA4-FLTR ③	15RBA4-SHNT
										RBA4-COND ③	

#### Type RDB Expulsion Fuses for Use Outdoors—15.5 kV Maximum (14.4 kV Nominal) 800A ④

##### RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Outdoor Applications)

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.	
		Catalog Number		Nominal	Maximum		Vertical (180°) Mounting Catalog Number	Underhung (90°) Mounting Catalog Number			
450E–720E	Disconnect	15RDB4-NH		13.8	15.5	110	15RDB8-VM	15RDB8-UM	RDB8-VL	RDB8-UL	15RDB4-SHNT
	Disconnect	15RDB4-NH		13.8	15.5	150	15RDB8-HVM	15RDB8-HUM	RDB8-VL	RDB8-UL	15RDB4-SHNT

##### Notes

- ① Requires two fuse refills as shown. Price each refill individually. Example: To order refill units for a 720E, 15 kV fuse, order two pieces of an 8RBA4-400E.
- ② For new installation, order two refills (Standard or Time Lag), one fuseholder, one mounting, and two filters or condensers per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ③ Two filters or condensers required.
- ④ For new installation, order two refills (Standard or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.

**Type 25RBA2 Expulsion Fuse Refill Units—25.5 kV Maximum (23.0 kV Nominal) 200A**

**RBA/RBT Refill Units**

Ampere Rating	Standard Speed (Fuse Refills)		Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
	Catalog Number	Curve Reference 36-635	Catalog Number	Curve Reference 36-635	
10E	25RBA2-10E	1, 2	—	—	1.3 (0.6)
15E	25RBA2-15E	1, 2	—	—	1.3 (0.6)
20E	25RBA2-20E	1, 2	25RBT2-20E	3, 4	1.3 (0.6)
25E	25RBA2-25E	1, 2	25RBT2-25E	3, 4	1.3 (0.6)
30E	25RBA2-30E	1, 2	25RBT2-30E	3, 4	1.3 (0.6)
40E	25RBA2-40E	1, 2	25RBT2-40E	3, 4	1.3 (0.6)
50E	25RBA2-50E	1, 2	25RBT2-50E	3, 4	1.3 (0.6)
65E	25RBA2-65E	1, 2	25RBT2-65E	3, 4	1.3 (0.6)
80E	25RBA2-80E	1, 2	25RBT2-80E	3, 4	1.3 (0.6)
100E	25RBA2-100E	1, 2	25RBT2-100E	3, 4	1.3 (0.6)
125E	25RBA2-125E	1, 2	25RBT2-125E	3, 4	1.3 (0.6)
150E	25RBA2-150E	1, 2	25RBT2-150E	3, 4	1.3 (0.6)
200E	25RBA2-200E	1, 2	25RBT2-200E	3, 4	1.3 (0.6)

**Type RBA Expulsion Fuses for Use Indoors or in an Enclosure—25.5 kV Maximum (23.0 kV Nominal) 200A (For Use with 25RBA2 Fuseholders) ①**

**RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Indoor or Enclosure Applications)**

Ampere Rating	Style	Fuseholder		Voltage (kV)			Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers	Spring and Shunt Assy.
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum	LIWL (BIL)	Porcelain Insulator Catalog Number	Glass Polyester Catalog Number			
10E–200E	Non-disconnect	25RBA2-NH	25RBA2-INH	23.0	25.5	150	25RBA2-PNM	—	38RBA2-NL	RBA2-FLTR RBA2-COND	25RBA2-SHNT
	Non-disconnect	25RBA2-NH	25RBA2-INH	23.0	25.5	150	25RBA2-PNM	—	38RBA2-NL	RBA2-FLTR RBA2-COND	25RBA2-SHNT
	Disconnect	25RBA2-DH	25RBA2-IDH	23.0	25.5	150	25RBA2-PDM	—	38RBA2-DL	RBA2-FLTR RBA2-COND	25RBA2-SHNT
	Disconnect	25RBA2-DH	25RBA2-IDH	23.0	25.5	150	25RBA2-PDM	—	38RBA2-DL	RBA2-FLTR RBA2-COND	25RBA2-SHNT
	Bolt-in	—	25RBA2-INH-B	23.0	25.5	150	25RBA8-PNM	24RBA8-GNM	38RBA8-NL	RBA2-FLTR RBA2-COND	25RBA2-SHNT

**Type RDB Expulsion Fuses for Use Outdoors—25.5 kV Maximum (23.0 kV Nominal) 200A ②**

**RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Outdoor Applications)**

Ampere Rating	Style	Fuseholder Catalog Number	Voltage (kV)			Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.	
			Nominal	Maximum	LIWL (BIL)	Vertical (180°) Mounting Catalog Number	Underhung (90°) Mounting Catalog Number			
										Catalog Number
10E–200E	Dropout	25RDB2-DH	23.0	25.5	150	25RDB2-VM	25RDB2-UM	RDB2-VL	RDB2-UL	25RDB2-SHNT
	Dropout	25RDB2-DH	23.0	25.5	200	25RDB2-HVM	25RDB2-HUM	RDB2-VL	RDB2-UL	25RDB2-SHNT

**Notes**

- ① For new installation, order one refill (Standard Speed or Time Lag), one fuseholder, one mounting, and one filter or condenser per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ② For new installation, order one refill (Standard Speed or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.

# 3.4

## Power Breakers, Contactors and Fuses

### Expulsion Fuses

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#### Type 25RBA4 Expulsion Fuse Refill Units—25.5 kV Maximum (23.0 kV Nominal) 400A

##### RBA/RBT Refill Units

Ampere Rating	Standard Speed (Fuse Refills)		Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
	Catalog Number	Curve Reference 36-635	Catalog Number	Curve Reference 36-635	
0.5	25RBA4-5	5, 6	—	—	2.7 (1.2)
3	25RBA4-3	5, 6	—	—	2.7 (1.2)
5E	25RBA4-5E	5, 6	—	—	2.7 (1.2)
7E	25RBA4-7E	5, 6	—	—	2.7 (1.2)
10E	25RBA4-10E	5, 6	—	—	2.7 (1.2)
15E	25RBA4-15E	5, 6	—	—	2.7 (1.2)
20E	25RBA4-20E	5, 6	25RBT4-20E	7, 8	2.7 (1.2)
25E	25RBA4-25E	5, 6	25RBT4-25E	7, 8	2.7 (1.2)
30E	25RBA4-30E	5, 6	25RBT4-30E	7, 8	2.7 (1.2)
40E	25RBA4-40E	5, 6	25RBT4-40E	7, 8	2.7 (1.2)
50E	25RBA4-50E	5, 6	25RBT4-50E	7, 8	2.7 (1.2)
65E	25RBA4-65E	5, 6	25RBT4-65E	7, 8	2.7 (1.2)
80E	25RBA4-80E	5, 6	25RBT4-80E	7, 8	2.7 (1.2)
100E	25RBA4-100E	5, 6	25RBT4-100E	7, 8	2.7 (1.2)
125E	25RBA4-125E	5, 6	25RBT4-125E	7, 8	2.7 (1.2)
150E	25RBA4-150E	5, 6	25RBT4-150E	7, 8	2.7 (1.2)
200E	25RBA4-200E	5, 6	25RBT4-200E	7, 8	2.7 (1.2)
250E	25RBA4-250E	5, 6	25RBT4-250E	10, 11	2.7 (1.2)
300E	25RBA4-300E	5, 6	25RBT4-300E	10, 11	2.7 (1.2)

#### Type RBA Expulsion Fuses for Use Indoors or in an Enclosure—25.5 kV Maximum (23.0 kV Nominal) 400A (For Use with 25RBA4 Fuseholders) ①

##### RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/Holders for Indoor or Enclosure Applications)

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers	Spring and Shunt Assy.
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum		Porcelain Insulator Catalog Number	Glass Polyester Catalog Number			
0.5–300E	Non-disconnect	25RBA4-NH	25RBA4-INH	23.0	25.5	150	25RBA4-PNM	—	38RBA4-NL	RBA4-FLTR RBA4-COND	25RBA4-SHNT
	Non-disconnect	25RBA4-NH	25RBA4-INH	23.0	25.5	150	25RBA4-PNM	—	38RBA4-NL	RBA4-FLTR RBA4-COND	25RBA4-SHNT
	Disconnect	25RBA4-DH	25RBA2-IDH	23.0	25.5	150	25RBA4-PDM	—	38RBA4-DL	RBA4-FLTR RBA4-COND	25RBA4-SHNT
	Disconnect	25RBA4-DH	25RBA2-IDH	23.0	25.5	150	25RBA4-PDM	—	38RBA4-DL	RBA4-FLTR RBA4-COND	25RBA4-SHNT
	Bolt-in	—	25RBA4-INH-B	23.0	25.5	150	25RBA8-PNM	25RBA8-GNM	38RBA8-NL	RBA4-FLTR RBA4-COND	25RBA4-SHNT

#### Type RDB Expulsion Fuses for Use Outdoors—25.5 kV Maximum (23.0 kV Nominal) 400A ②

##### RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/Holders for Outdoor Applications)

Ampere Rating	Style	Fuseholder Catalog Number	Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.	
			Nominal	Maximum		Vertical (180°) Mounting Catalog Number	Underhung (90°) Mounting Catalog Number			
0.5–300E	Dropout	25RDB4-DH	23.0	25.5	150	25RDB4-VM	25RDB4-UM	RDB4-VL	RDB4-UL	25RDB4-SHNT
	Dropout	25RDB4-DH	23.0	25.5	200	25RDB4-HVM	25RDB4-HUM	RDB4-VL	RDB4-UL	25RDB4-SHNT

##### Notes

- ① For new installation, order one refill (Standard Speed or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ② For new installation, order one refill (Standard Speed or Time Lag), one fuseholder, one mounting, and one filter or condenser per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.

**Type 25RBA4 Expulsion Fuse Refill Units Used in 25RBA8/15RDB4 Fuseholders—  
25.5 kV Maximum (23.0 kV Nominal) 800A**

**RBA/RBT Refill Units**

Ampere Rating	Quantity	Standard Speed (Fuse Refills)		Quantity	Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
		Catalog Number	Curve Reference 36-635		Catalog Number	Curve Reference 36-635	
450E	2	25RBA4-250E	9	2	25RBT4-250E	12	①
540E	2	25RBA4-300E	9	2	25RBT4-300E	12	①

**Type RBA Expulsion Fuses for Use Indoors or in an Enclosure—  
25.5 kV Maximum (23.0 kV Nominal) 800A (For Use with 25RBA8 Fuseholders) ②**

**RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Indoor or Enclosure Applications)**

Ampere Rating	Style	Fuseholder		Voltage (kV)			Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers	Spring and Shunt Assy.
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum	LIWL (BIL)	Porcelain Insulator Catalog Number	Glass Polyester Catalog Number			
450E–540E	Non-disconnect	25RBA8-NH	25RBA8-INH	23.0	25.5	150	25RBA8-PNM	—	38RBA8-NL	RBA4-FLTR ③ RBA4-COND ③	25RBA4-SHNT
	Non-disconnect	25RBA8-NH	25RBA8-INH	23.0	25.5	150	25RBA8-PNM	—	38RBA8-NL	RBA4-FLTR ③ RBA4-COND ③	25RBA4-SHNT

**Type RDB Expulsion Fuses for Use Outdoors—25.5 kV Maximum (23.0 kV Nominal) 800A ④**

**RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Outdoor Applications)**

Ampere Rating	Style	Fuseholder		Voltage (kV)			Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.
		Catalog Number	Nominal	Maximum	LIWL (BIL)	Vertical (180°) Mounting Catalog Number	Underhung (90°) Mounting Catalog Number			
								Catalog Number		
450E–540E	Disconnect	25RDB4-NH	23.0	25.5	150	25RDB8-VM	25RDB8-UM	RDB8-VL	RDB8-UL	25RDB4-SHNT
	Disconnect	25RDB4-NH	23.0	25.5	200	25RDB8-HVM	25RDB8-HUM	RDB8-VL	RDB8-UL	25RDB4-SHNT

**Notes**

- ① Requires two fuse refills as shown. Price each refill individually. Example: To order refill units for a 720E, 25 kV fuse, order two pieces of an 8RBA4-400E.
- ② For new installation, order two refills (Standard or Time Lag), one fuseholder, one mounting, and two filters or condensers per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ③ Two filters or condensers required.
- ④ For new installation, order two refills (Standard or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.

# 3.4

## Power Breakers, Contactors and Fuses

### Expulsion Fuse

3

#### Type 38RBA2 Expulsion Fuse Refill Units—38.0 kV Maximum (34.5 kV Nominal) 200A

##### RBA/RBT Refill Units

Ampere Rating	Standard Speed (Fuse Refills)		Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
	Catalog Number	Curve Reference 36-635	Catalog Number	Curve Reference 36-635	
10E	38RBA2-10E	1, 2	—	—	1.4 (0.6)
15E	38RBA2-15E	1, 2	—	—	1.4 (0.6)
20E	38RBA2-20E	1, 2	38RBT2-20E	3, 4	1.4 (0.6)
25E	38RBA2-25E	1, 2	38RBT2-25E	3, 4	1.4 (0.6)
30E	38RBA2-30E	1, 2	38RBT2-30E	3, 4	1.4 (0.6)
40E	38RBA2-40E	1, 2	38RBT2-40E	3, 4	1.4 (0.6)
50E	38RBA2-50E	1, 2	38RBT2-50E	3, 4	1.4 (0.6)
65E	38RBA2-65E	1, 2	38RBT2-65E	3, 4	1.4 (0.6)
80E	38RBA2-80E	1, 2	38RBT2-80E	3, 4	1.4 (0.6)
100E	38RBA2-100E	1, 2	38RBT2-100E	3, 4	1.4 (0.6)
125E	38RBA2-125E	1, 2	38RBT2-125E	3, 4	1.4 (0.6)
150E	38RBA2-150E	1, 2	38RBT2-150E	3, 4	1.4 (0.6)
200E	38RBA2-200E	1, 2	38RBT2-200E	3, 4	1.4 (0.6)

#### Type RBA Expulsion Fuses for Use Indoors or in an Enclosure—38.0 kV Maximum (34.5 kV Nominal) 200A (For Use with 38RBA2 Fuseholders) ①

##### RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Indoor or Enclosure Applications)

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers	Spring and Shunt Assy.
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum		Porcelain Insulator	Glass Polyester			
10E–200E	Non-disconnect	38RBA2-NH	38RBA2-INH	34.5	38.0	150	38RBA2-PNM	—	38RBA2-NL	RBA2-FLTR RBA2-COND	38RBA2-SHNT
	Non-disconnect	38RBA2-NH	38RBA2-INH	34.5	38.0	150	38RBA2-PNM	—	38RBA2-NL	RBA2-FLTR RBA2-COND	38RBA2-SHNT
	Disconnect	38RBA2-DH	38RBA2-IDH	34.5	38.0	150	38RBA2-PDM	—	38RBA2-DL	RBA2-FLTR RBA2-COND	38RBA2-SHNT
	Disconnect	38RBA2-DH	38RBA2-IDH	34.5	38.0	150	38RBA2-PDM	—	38RBA2-DL	RBA2-FLTR RBA2-COND	38RBA2-SHNT
	Bolt-in	—	38RBA2-INH-B	34.5	38.0	150	38RBA8-PNM	38RBA8-GNM	38RBA8-NL	RBA2-FLTR RBA2-COND	38RBA2-SHNT

#### Type RBA Expulsion Fuses for Use Indoors or in an Enclosure—38.0 kV Maximum (34.5 kV Nominal) 200A ②

##### RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Outdoor Applications)

Ampere Rating	Style	Fuseholder Catalog Number	Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.
			Nominal	Maximum		Vertical (180°) Mounting	Underhung (90°) Mounting		
10E–200E	Dropout	38RDB2-DH	34.5	38.0	200	38RDB2-VM	38RDB2-UM	RDB2-VL	RDB2-UL 38RDB2-SHNT
	Dropout	38RDB2-DH	34.5	38.0	250	38RDB2-HVM	38RDB2-HUM	RDB2-VL	RDB2-UL 38RDB2-SHNT

##### Notes

- ① For new installation, order one refill (Standard Speed or Time Lag), one fuseholder, one mounting, and one filter or condenser per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ② For new installation, order one refill (Standard Speed or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.

**Type 38RBA4 Expulsion Fuse Refill Units—38.0 kV Maximum (34.5 kV Nominal) 400A**

**RBA/RBT Refill Units**

Ampere Rating	Standard Speed (Fuse Refills)		Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
	Catalog Number	Curve Reference 36-635	Catalog Number	Curve Reference 36-635	
0.5	38RBA4-5	5, 6	—	—	3.1 (1.4)
3	38RBA4-3	5, 6	—	—	3.1 (1.4)
5E	38RBA4-5E	5, 6	—	—	3.1 (1.4)
7E	38RBA4-7E	5, 6	—	—	3.1 (1.4)
10E	38RBA4-10E	5, 6	—	—	3.1 (1.4)
15E	38RBA4-15E	5, 6	—	—	3.1 (1.4)
20E	38RBA4-20E	5, 6	38RBT4-20E	7, 8	3.1 (1.4)
25E	38RBA4-25E	5, 6	38RBT4-25E	7, 8	3.1 (1.4)
30E	38RBA4-30E	5, 6	38RBT4-30E	7, 8	3.1 (1.4)
40E	38RBA4-40E	5, 6	38RBT4-40E	7, 8	3.1 (1.4)
50E	38RBA4-50E	5, 6	38RBT4-50E	7, 8	3.1 (1.4)
65E	38RBA4-65E	5, 6	38RBT4-65E	7, 8	3.1 (1.4)
80E	38RBA4-80E	5, 6	38RBT4-80E	7, 8	3.1 (1.4)
100E	38RBA4-100E	5, 6	38RBT4-100E	7, 8	3.1 (1.4)
125E	38RBA4-125E	5, 6	38RBT4-125E	7, 8	3.1 (1.4)
150E	38RBA4-150E	5, 6	38RBT4-150E	7, 8	3.1 (1.4)
200E	38RBA4-200E	5, 6	38RBT4-200E	7, 8	3.1 (1.4)
250E	38RBA4-250E	5, 6	38RBT4-250E	10, 11	3.1 (1.4)
300E	38RBA4-300E	5, 6	38RBT4-300E	(0, 11)	3.1 (1.4)

**Type RBA Expulsion Fuses for Use Indoors or in an Enclosure—38.0 kV Maximum (34.5 kV Nominal) 400A (For Use with 38RBA4 Fuseholders) ①**

**RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Indoor or Enclosure Applications)**

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers		Spring and Shunt Assy.
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum		Porcelain Insulator	Glass Polyester		Catalog Number	Catalog Number	
0.5–300E	Non-disconnect	38RBA4-NH	38RBA4-INH	34.5	38.0	150	38RBA4-PNM	—	38RBA4-NL	RBA4-FLTR RBA4-COND	38RBA4-SHNT	
	Non-disconnect	38RBA4-NH	38RBA4-INH	34.5	38.0	150	38RBA4-PNM	—	38RBA4-NL	RBA4-FLTR RBA4-COND	38RBA4-SHNT	
	Disconnect	38RBA4-DH	38RBA2-IDH	34.5	38.0	150	38RBA4-PDM	—	38RBA4-DL	RBA4-FLTR RBA4-COND	38RBA4-SHNT	
	Disconnect	38RBA4-DH	38RBA2-IDH	34.5	38.0	150	38RBA4-PDM	—	38RBA4-DL	RBA4-FLTR RBA4-COND	38RBA4-SHNT	
	Bolt-in	—	38RBA4-INH-B	34.5	38.0	150	38RBA8-PNM	38RBA8-GNM	38RBA8-NL	RBA4-FLTR RBA4-COND	38RBA4-SHNT	

**Type RBA Expulsion Fuses for Use Indoors or in an Enclosure—38.0 kV Maximum (34.5 kV Nominal) 400A ②**

**RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Outdoor Applications)**

Ampere Rating	Style	Fuseholder Catalog Number	Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.	
			Nominal	Maximum		Vertical (180°) Mounting	Underhung (90°) Mounting		Vertical Catalog Number	Underhung Catalog Number
0.5–300E	Dropout	38RDB4-DH	34.5	38.0	150	38RDB4-VM	38RDB4-UM	RDB4-VL	RDB4-UL	38RDB4-SHNT
	Dropout	38RDB4-DH	34.5	38.0	200	38RDB4-HVM	38RDB4-HUM	RDB4-VL	RDB4-UL	38RDB4-SHNT

**Notes**

- ① For new installation, order one refill (Standard Speed or Time Lag), one fuseholder, one mounting, and one filter or condenser per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ② For new installation, order one refill (Standard Speed or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.

# 3.4

## Power Breakers, Contactors and Fuses

### Expulsion Fuses

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#### Type 38RBA4 Expulsion Fuse Refill Units Used in 38RBA8/15RDB4 Fuseholders—38.0 kV Maximum (34.5 kV Nominal) 800A

##### RBA/RBT Refill Units

Ampere Rating	Quantity	Standard Speed (Fuse Refills)		Quantity	Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
		Catalog Number	Curve Reference 36-635		Catalog Number	Curve Reference 36-635	
450E	2	38RBA4-250E	9	2	38RBT4-250E	12	①
540E	2	38RBA4-300E	9	2	38RBT4-300E	12	①

#### Type RBA Expulsion Fuses for Use Indoors or in an Enclosure—38.0 kV Maximum (34.5 kV Nominal) 800A (For Use with 38RBA8 Fuseholders) ②

##### RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Indoor or Enclosure Applications)

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers	Spring and Shunt Assy.
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum		Porcelain Insulator	Glass Polyester			
450E-540E	Non-disconnect	38RBA8-NH	38RBA8-INH	34.5	38.0	150	38RBA8-PNM	—	38RBA8-NL	RBA4-FLTR ③ RBA4-COND ③	38RBA4-SHNT
	Non-disconnect	38RBA8-NH	38RBA8-INH	34.5	38.0	150	38RBA8-PNM	—	38RBA8-NL	RBA4-FLTR ③ RBA4-COND ③	38RBA4-SHNT

#### Type RBA Expulsion Fuses for Use Indoors or in an Enclosure—38.0 kV Maximum (34.5 kV Nominal) 800A ④

##### RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Outdoor Applications)

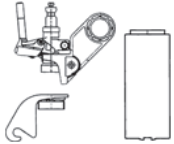
Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.	
		Catalog Number	Indicating Catalog Number	Nominal	Maximum		Vertical (180°) Mounting	Underhung (90°) Mounting			
450E-540E	Disconnect	38RDB4-NH	38RDB4-INH	34.5	38.0	150	38RDB8-VM	38RDB8-UM	RDB8-VL	RDB8-UL	38RDB4-SHNT
	Disconnect	38RDB4-NH	38RDB4-INH	34.5	38.0	200	38RDB8-HVM	38RDB8-HUM	RDB8-VL	RDB8-UL	38RDB4-SHNT

##### Notes

- ① Requires two fuse refills as shown. Price each refill individually. Example: To order refill units for a 720E, 38 kV fuse, order 2 pieces of an 8RBA4-400E.
- ② For new installation, order two refills (Standard or Time Lag), one fuseholder, one mounting, and two filters or condensers per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ③ Two filters or condensers required.
- ④ For new installation, order two refills (Standard or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.

Type DBU

DBU-EFID



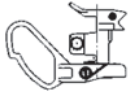
DBU17-GNM



DBU17-GDM



DBU-EFOD



Type DBU Expulsion Fuse Units 17.1 kV Maximum, 14.4 kV Nominal

Ampere Rating	Standard Speed			Slow Speed			K Speed		
	Catalog Number ①②	Curve Reference 36-643		Ampere Rating	Catalog Number ①②	Curve Reference 36-643	Ampere Rating	Catalog Number ①②	Curve Reference 36-643
5E	DBU17-5E	11,14	—	—	—	—	3K	DBU17-3K	12, 15
7E	DBU17-7E	11,14	—	—	—	—	6K	DBU17-6K	12, 15
10E	DBU17-10E	11,14	—	—	—	—	8K	DBU17-8K	12, 15
13E	DBU17-13E	11,14	—	—	—	—	10K	DBU17-10K	12, 15
15E	DBU17-15E	11,14	15SE	DBU17-15SE	10, 13	—	12K	DBU17-12K	12, 15
20E	DBU17-20E	11,14	20SE	DBU17-20SE	10, 13	—	15K	DBU17-15K	12, 15
25E	DBU17-25E	11,14	25SE	DBU17-25SE	10, 13	—	20K	DBU17-20K	12, 15
30E	DBU17-30E	11,14	30SE	DBU17-30SE	10, 13	—	25K	DBU17-25K	12, 15
40E	DBU17-40E	11,14	40SE	DBU17-40SE	10, 13	—	30K	DBU17-30K	12, 15
50E	DBU17-50E	11,14	50SE	DBU17-50SE	10, 13	—	40K	DBU17-40K	12, 15
65E	DBU17-65E	11,14	65SE	DBU17-65SE	10, 13	—	50K	DBU17-50K	12, 15
80E	DBU17-80E	11,14	80SE	DBU17-80SE	10, 13	—	65K	DBU17-65K	12, 15
100E	DBU17-100E	11,14	100SE	DBU17-100SE	10, 13	—	80K	DBU17-80K	12, 15
125E	DBU17-125E	11,14	125SE	DBU17-125SE	10, 13	—	100K	DBU17-100K	12, 15
150E	DBU17-150E	11,14	150SE	DBU17-150SE	10, 13	—	140K	DBU17-140K	12, 15
175E	DBU17-175E	11,14	175SE	DBU17-175SE	10, 13	—	200K	DBU17-200K	12, 15
200E	DBU17-200E	11,14	200SE	DBU17-200SE	10, 13	—	—	—	—

Type DBU Expulsion Fuse Mountings 17.1 kV Maximum, 14.4 kV Nominal

Ampere Rating	Style		Voltage (kV)			Mounting	Live Parts	End Fittings	Muffler
	Style	Style	Nominal	Maximum	LIWL (BIL)				
5E–200E, 15SE–200SE, 3K–200K	Indoor	Non loadbreak	13.8	17.1	95	DBU17-GNM ③	DBU17-NL ③	DBU-EFID ④	DBU-MFLR
	Indoor	Loadbreak	13.8	17.1	95	DBU17-GDM ③	DBU17-DL ③	DBU-EFID ④	DBU-MFLR
	Outdoor	Dropout	13.8	17.1	125	DBU-17-DM	—	DBU-EFOD	—

Notes

- ① Maximum interrupting rating 14 kA symmetrical.
- ② Approximate shipping weight 2.1 lb (0.95 kg).
- ③ To complete the mounting catalog number, specify -R for right side cale terminator or -L for left side cale terminator.
- ④ End fittings DBU-EFID include a muffler.



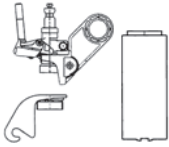
# 3.4

## Power Breakers, Contactors and Fuses

### Expulsion Fuses

3

#### DBU-EFID



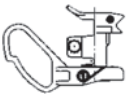
#### DBU17-GNM



#### DBU17-GDM



#### DBU-EFOD



#### Type DBU Expulsion Fuse Units 27.0 kV Maximum, 25 kV Nominal

Ampere Rating	Standard Speed			Slow Speed			K Speed		
	Catalog Number <sup>①②</sup>	Curve Reference 36-643	Ampere Rating	Catalog Number <sup>①②</sup>	Curve Reference 36-643	Ampere Rating	Catalog Number <sup>①②</sup>	Curve Reference 36-643	
5E	DBU27-5E	11,17	—	—	—	3K	DBU27-3K	12, 18	
7E	DBU27-7E	11,17	—	—	—	6K	DBU27-6K	12, 18	
10E	DBU27-10E	11,17	—	—	—	8K	DBU27-8K	12, 18	
13E	DBU27-13E	11,17	—	—	—	10K	DBU27-10K	12, 18	
15E	DBU27-15E	11,17	15SE	DBU27-15SE	10, 16	12K	DBU27-12K	12, 18	
20E	DBU27-20E	11,17	20SE	DBU27-20SE	10, 16	15K	DBU27-15K	12, 18	
25E	DBU27-25E	11,17	25SE	DBU27-25SE	10, 16	20K	DBU27-20K	12, 18	
30E	DBU27-30E	11,17	30SE	DBU27-30SE	10, 16	25K	DBU27-25K	12, 18	
40E	DBU27-40E	11,17	40SE	DBU27-40SE	10, 16	30K	DBU27-30K	12, 18	
50E	DBU27-50E	11,17	50SE	DBU27-50SE	10, 16	40K	DBU27-40K	12, 18	
65E	DBU27-65E	11,17	65SE	DBU27-65SE	10, 16	50K	DBU27-50K	12, 18	
80E	DBU27-80E	11,17	80SE	DBU27-80SE	10, 16	65K	DBU27-65K	12, 18	
100E	DBU27-100E	11,17	100SE	DBU27-100SE	10, 16	80K	DBU27-80K	12, 18	
125E	DBU27-125E	11,17	125SE	DBU27-125SE	10, 16	100K	DBU27-100K	12, 18	
150E	DBU27-150E	11,17	150SE	DBU27-150SE	10, 16	140K	DBU27-140K	12, 18	
175E	DBU27-175E	11,17	175SE	DBU27-175SE	10, 16	200K	DBU27-200K	12, 18	
200E	DBU27-200E	11,17	200SE	DBU27-200SE	10, 16	—	—	—	

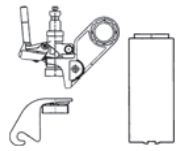
#### Type DBU Expulsion Fuse Mountings 27.0 kV Maximum, 25 kV Nominal

Ampere Rating	Style	Style	Voltage (kV)			Mounting	Live Parts	End Fittings	Muffler
			Nominal	Maximum	LIWL (BIL)				
5E–200E, 15SE–200SE, 3K–200K	Indoor	Non loadbreak	23.5	27.0	110	DBU27-GNM <sup>③</sup>	DBU27-NL <sup>③</sup>	DBU-EFID <sup>④</sup>	DBU-MFLR
		Loadbreak	23.5	27.0	110	DBU27-GDM <sup>③</sup>	DBU27-DL <sup>③</sup>	DBU-EFID <sup>④</sup>	DBU-MFLR
	Outdoor	Dropout	23.5	27.0	150	DBU-27-DM	—	DBU-EFOD	—

#### Notes

- ① Maximum interrupting rating 12.5kA symmetrical.
- ② Approximate shipping weight 2.1 lb (0.95 kg).
- ③ To complete the mounting catalog number, specify -R for right side cable terminator or -L for left side cable terminator.
- ④ End fittings DBU-EFID include a muffler.

**DBU-EFID**



**Type DBU Expulsion Fuse Units 38.8 kV Maximum, 34.5 kV Nominal**

Ampere Rating	Standard Speed			Slow Speed			K Speed		
	Catalog Number <sup>①②</sup>	Curve Reference 36-643	Ampere Rating	Catalog Number <sup>②</sup>	Curve Reference 36-643	Ampere Rating	Catalog Number <sup>①②</sup>	Curve Reference 36-643	
5E	DBU38-5E	11,17	—	—	—	3K	DBU38-3K	12, 18	
7E	DBU38-7E	11,17	—	—	—	6K	DBU38-6K	12, 18	
10E	DBU38-10E	11,17	—	—	—	8K	DBU38-8K	12, 18	
13E	DBU38-13E	11,17	—	—	—	10K	DBU38-10K	12, 18	
15E	DBU38-15E	11,17	15SE	DBU38-15SE	10, 16	12K	DBU38-12K	12, 18	
20E	DBU38-20E	11,17	20SE	DBU38-20SE	10, 16	15K	DBU38-15K	12, 18	
25E	DBU38-25E	11,17	25SE	DBU38-25SE	10, 16	20K	DBU38-20K	12, 18	
30E	DBU38-30E	11,17	30SE	DBU38-30SE	10, 16	25K	DBU38-25K	12, 18	
40E	DBU38-40E	11,17	40SE	DBU38-40SE	10, 16	30K	DBU38-30K	12, 18	
50E	DBU38-50E	11,17	50SE	DBU38-50SE	10, 16	40K	DBU38-40K	12, 18	
65E	DBU38-65E	11,17	65SE	DBU38-65SE	10, 16	50K	DBU38-50K	12, 18	
80E	DBU38-80E	11,17	80SE	DBU38-80SE	10, 16	65K	DBU38-65K	12, 18	
100E	DBU38-100E	11,17	100SE	DBU38-100SE	10, 16	80K	DBU38-80K	12, 18	
125E	DBU38-125E	11,17	125SE	DBU38-125SE	10, 16	100K	DBU38-100K	12, 18	
150E	DBU38-150E	11,17	150SE	DBU38-150SE	10, 16	140K	DBU38-140K	12, 18	
175E	DBU38-175E	11,17	175SE	DBU38-175SE	10, 16	200K	DBU38-200K	12, 18	
200E	DBU38-200E	11,17	200SE	DBU38-200SE	10, 16	—	—	—	

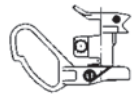
**DBU17-GNM**



**DBU17-GDM**



**DBU-EFOD**



**Type DBU Expulsion Fuse Mountings 38.0 kV Maximum, 34.5 kV Nominal**

Ampere Rating	Style	Style	Voltage (kV)			Mounting	Live Parts	End Fittings	Muffler
			Nominal	Maximum	LIWL (BIL)				
5E–200E, 15SE–200SE, 3K–200K	Indoor	Non loadbreak	34.5	38	150	DBU38-GNM <sup>③</sup>	DBU38-NL <sup>③</sup>	DBU-EFID <sup>④</sup>	DBU-MFLR

**Notes**

- ① Maximum interrupting rating 10 kA symmetrical (outdoor dropout, 8.5 kA indoor with muffler).
- ② Approximate shipping weight 2.1 lb (0.95 kg).
- ③ To complete the mounting catalog number, specify -R for right side cale terminator or -L for left side cale terminator.
- ④ End fittings DBU-EFID includes a muffler.

# 3.4

## Power Breakers, Contactors and Fuses

### Expulsion Fuses

#### Technical Data and Specifications

##### Type DBA

##### Type DBA Expulsion Fuses for Use Indoors or Outdoors

3

Ampere Rating	DBA-1 Fuse Units Catalog Number	Curve Reference 36-623	Approximate Shipping Weight Lbs (kg)
<b>Type DBA-1 Fuse Refills</b>			
<b>8.3 kV Maximum (7.2 kV Nominal)</b>			
0.5	8DBA1-5	10, 11	1.5 (0.7)
3	8DBA1-3	10, 11	1.5 (0.7)
5E	8DBA1-5E	10, 11	1.5 (0.7)
7E	8DBA1-7E	10, 11	1.5 (0.7)
10E	8DBA1-10E	10, 11	1.5 (0.7)
15E	8DBA1-15E	10, 11	1.5 (0.7)
20E	8DBA1-20E	10, 11	1.5 (0.7)
25E	8DBA1-25E	10, 11	1.5 (0.7)
30E	8DBA1-30E	10, 11	1.5 (0.7)
40E	8DBA1-40E	10, 11	1.5 (0.7)
50E	8DBA1-50E	10, 11	1.5 (0.7)
65E	8DBA1-65E	10, 11	1.5 (0.7)
80E	8DBA1-80E	10, 11	1.5 (0.7)
100E	8DBA1-100E	10, 11	1.5 (0.7)
125E	8DBA1-125E	10, 11	1.5 (0.7)
150E	8DBA1-150E	10, 11	1.5 (0.7)
200E	8DBA1-200E	10, 11	1.5 (0.7)
<b>15.5 kV Maximum (14.4 kV Nominal)</b>			
0.5	15DBA1-5	10, 11	2.1 (0.95)
3	15DBA1-3	10, 11	2.1 (0.95)
5E	15DBA1-5E	10, 11	2.1 (0.95)
7E	15DBA1-7E	10, 11	2.1 (0.95)
10E	15DBA1-10E	10, 11	2.1 (0.95)
15E	15DBA1-15E	10, 11	2.1 (0.95)
20E	15DBA1-20E	10, 11	2.1 (0.95)
25E	15DBA1-25E	10, 11	2.1 (0.95)
30E	15DBA1-30E	10, 11	2.1 (0.95)
40E	15DBA1-40E	10, 11	2.1 (0.95)
50E	15DBA1-50E	10, 11	2.1 (0.95)
65E	15DBA1-65E	10, 11	2.1 (0.95)
80E	15DBA1-80E	10, 11	2.1 (0.95)
100E	15DBA1-100E	10, 11	2.1 (0.95)
125E	15DBA1-125E	10, 11	2.1 (0.95)
150E	15DBA1-150E	10, 11	2.1 (0.95)
200E	15DBA1-200E	10, 11	2.1 (0.95)

Ampere Rating	DBA-1 Fuse Units Catalog Number	Curve Reference 36-623	Approximate Shipping Weight Lbs (kg)
<b>25 kV Maximum (23 kV Nominal)</b>			
0.5	25DBA1-5	10, 11	3.1 (1.4)
3	25DBA1-3	10, 11	3.1 (1.4)
5E	25DBA1-5E	10, 11	3.1 (1.4)
7E	25DBA1-7E	10, 11	3.1 (1.4)
10E	25DBA1-10E	10, 11	3.1 (1.4)
15E	25DBA1-15E	10, 11	3.1 (1.4)
20E	25DBA1-20E	10, 11	3.1 (1.4)
25E	25DBA1-25E	10, 11	3.1 (1.4)
30E	25DBA1-30E	10, 11	3.1 (1.4)
40E	25DBA1-40E	10, 11	3.1 (1.4)
50E	25DBA1-50E	10, 11	3.1 (1.4)
65E	25DBA1-65E	10, 11	3.1 (1.4)
80E	25DBA1-80E	10, 11	3.1 (1.4)
100E	25DBA1-100E	10, 11	3.1 (1.4)
125E	25DBA1-125E	10, 11	3.1 (1.4)
150E	25DBA1-150E	10, 11	3.1 (1.4)
200E	25DBA1-200E	10, 11	3.1 (1.4)

Type DBA Expulsion Fuses for Use Indoors or Outdoors, continued

Ampere Rating	DBA-1 Fuse Units Catalog Number	Curve Reference 36-623	Approximate Shipping Weight Lbs (kg)
<b>Type DBA-1 Fuse Refills 38 kV Maximum (34.5 kV Nominal)</b>			
0.5	38DBA1-5	10, 12	4.2 (1.9)
3	38DBA1-3	10, 12	4.2 (1.9)
5E	38DBA1-5E	10, 12	4.2 (1.9)
7E	38DBA1-7E	10, 12	4.2 (1.9)
10E	38DBA1-10E	10, 12	4.2 (1.9)
15E	38DBA1-15E	10, 12	4.2 (1.9)
20E	38DBA1-20E	10, 12	4.2 (1.9)
25E	38DBA1-25E	10, 12	4.2 (1.9)
30E	38DBA1-30E	10, 12	4.2 (1.9)
40E	38DBA1-40E	10, 12	4.2 (1.9)
50E	38DBA1-50E	10, 12	4.2 (1.9)
65E	38DBA1-65E	10, 12	4.2 (1.9)
80E	38DBA1-80E	10, 12	4.2 (1.9)
100E	38DBA1-100E	10, 12	4.2 (1.9)
125E	38DBA1-125E	10, 12	4.2 (1.9)
150E	38DBA1-150E	10, 12	4.2 (1.9)
200E	38DBA1-200E	10, 12	4.2 (1.9)
<b>48 kV Maximum (46 kV Nominal)</b>			
0.5	48DBA1-5	10, 12	6.5 (3.0)
3	48DBA1-3	10, 12	6.5 (3.0)
5E	48DBA1-5E	10, 12	6.5 (3.0)
7E	48DBA1-7E	10, 12	6.5 (3.0)
10E	48DBA1-10E	10, 12	6.5 (3.0)
15E	48DBA1-15E	10, 12	6.5 (3.0)
20E	48DBA1-20E	10, 12	6.5 (3.0)
25E	48DBA1-25E	10, 12	6.5 (3.0)
30E	48DBA1-30E	10, 12	6.5 (3.0)
40E	48DBA1-40E	10, 12	6.5 (3.0)
50E	48DBA1-50E	10, 12	6.5 (3.0)
65E	48DBA1-65E	10, 12	6.5 (3.0)
80E	48DBA1-80E	10, 12	6.5 (3.0)
100E	48DBA1-100E	10, 12	6.5 (3.0)
125E	48DBA1-125E	10, 12	6.5 (3.0)
150E	48DBA1-150E	10, 12	6.5 (3.0)
200E	48DBA1-200E	10, 12	6.5 (3.0)

Ampere Rating	DBA-1 Fuse Units Catalog Number	Curve Reference 36-623	Approximate Shipping Weight Lbs (kg)
<b>72 kV Maximum (69 kV Nominal)</b>			
0.5	72DBA1-5	10, 12	7.1 (3.2)
3	72DBA1-3	10, 12	7.1 (3.2)
5E	72DBA1-5E	10, 12	7.1 (3.2)
7E	72DBA1-7E	10, 12	7.1 (3.2)
10E	72DBA1-10E	10, 12	7.1 (3.2)
15E	72DBA1-15E	10, 12	7.1 (3.2)
20E	72DBA1-20E	10, 12	7.1 (3.2)
25E	72DBA1-25E	10, 12	7.1 (3.2)
30E	72DBA1-30E	10, 12	7.1 (3.2)
40E	72DBA1-40E	10, 12	7.1 (3.2)
50E	72DBA1-50E	10, 12	7.1 (3.2)
65E	72DBA1-65E	10, 12	7.1 (3.2)
80E	72DBA1-80E	10, 12	7.1 (3.2)
100E	72DBA1-100E	10, 12	7.1 (3.2)
125E	72DBA1-125E	10, 12	7.1 (3.2)
150E	72DBA1-150E	10, 12	7.1 (3.2)
200E	72DBA1-200E	10, 12	7.1 (3.2)

# 3.4

## Power Breakers, Contactors and Fuses

### Expulsion Fuses

#### Type DBA Expulsion Fuses for Use Indoors or Outdoors, continued

3

Ampere Rating	DBA-1 Fuse Units Catalog Number	Curve Reference 36-623	Approximate Shipping Weight Lbs (kg)
<b>Type DBA-2 Fuse Refills</b>			
<b>38 kV Maximum (34.5 kV Nominal)</b>			
0.5	38DBA2-5	10, 12	10 (4.5)
3	38DBA2-3	10, 12	10 (4.5)
5E	38DBA2-5E	10, 12	10 (4.5)
7E	38DBA2-7E	10, 12	10 (4.5)
10E	38DBA2-10E	10, 12	10 (4.5)
15E	38DBA2-15E	10, 12	10 (4.5)
20E	38DBA2-20E	10, 12	10 (4.5)
25E	38DBA2-25E	10, 12	10 (4.5)
30E	38DBA2-30E	10, 12	10 (4.5)
40E	38DBA2-40E	10, 12	10 (4.5)
50E	38DBA2-50E	10, 12	10 (4.5)
65E	38DBA2-65E	10, 12	10 (4.5)
80E	38DBA2-80E	10, 12	10 (4.5)
100E	38DBA2-100E	10, 12	10 (4.5)
125E	38DBA2-125E	10, 12	10 (4.5)
150E	38DBA2-150E	10, 12	10 (4.5)
200E	38DBA2-200E	10, 12	10 (4.5)
<b>48 kV Maximum (46 kV Nominal)</b>			
0.5	48DBA2-5	10, 12	12 (5.4)
3	48DBA2-3	10, 12	12 (5.4)
5E	48DBA2-5E	10, 12	12 (5.4)
7E	48DBA2-7E	10, 12	12 (5.4)
10E	48DBA2-10E	10, 12	12 (5.4)
15E	48DBA2-15E	10, 12	12 (5.4)
20E	48DBA2-20E	10, 12	12 (5.4)
25E	48DBA2-25E	10, 12	12 (5.4)
30E	48DBA2-30E	10, 12	12 (5.4)
40E	48DBA2-40E	10, 12	12 (5.4)
50E	48DBA2-50E	10, 12	12 (5.4)
65E	48DBA2-65E	10, 12	12 (5.4)
80E	48DBA2-80E	10, 12	12 (5.4)
100E	48DBA2-100E	10, 12	12 (5.4)
125E	48DBA2-125E	10, 12	12 (5.4)
150E	48DBA2-150E	10, 12	12 (5.4)
200E	48DBA2-200E	10, 12	12 (5.4)

Ampere Rating	DBA-1 Fuse Units Catalog Number	Curve Reference 36-623	Approximate Shipping Weight Lbs (kg)
<b>72 kV Maximum (69 kV Nominal)</b>			
0.5	72DBA2-5	10, 12	15 (6.8)
3	72DBA2-3	10, 12	15 (6.8)
5E	72DBA2-5E	10, 12	15 (6.8)
7E	72DBA2-7E	10, 12	15 (6.8)
10E	72DBA2-10E	10, 12	15 (6.8)
15E	72DBA2-15E	10, 12	15 (6.8)
20E	72DBA2-20E	10, 12	15 (6.8)
25E	72DBA2-25E	10, 12	15 (6.8)
30E	72DBA2-30E	10, 12	15 (6.8)
40E	72DBA2-40E	10, 12	15 (6.8)
50E	72DBA2-50E	10, 12	15 (6.8)
65E	72DBA2-65E	10, 12	15 (6.8)
80E	72DBA2-80E	10, 12	15 (6.8)
100E	72DBA2-100E	10, 12	15 (6.8)
125E	72DBA2-125E	10, 12	15 (6.8)
150E	72DBA2-150E	10, 12	15 (6.8)
200E	72DBA2-200E	10, 12	15 (6.8)

Type DBA Expulsion Fuses for Use Indoors or Outdoors, continued

Ampere Rating	DBA-1 Fuse Units Catalog Number	Curve Reference 36-623	Approximate Shipping Weight Lbs (kg)
<b>Type DBA-2 Fuse Refills 92 kV Maximum (92 kV Nominal)</b>			
3	92DBA2-3	10, 13	19 (8.6)
5E	92DBA2-5E	10, 13	19 (8.6)
7E	92DBA2-7E	10, 13	19 (8.6)
10E	92DBA2-10E	10, 13	19 (8.6)
15E	92DBA2-15E	10, 13	19 (8.6)
20E	92DBA2-20E	10, 13	19 (8.6)
25E	92DBA2-25E	10, 13	19 (8.6)
30E	92DBA2-30E	10, 13	19 (8.6)
40E	92DBA2-40E	10, 13	19 (8.6)
50E	92DBA2-50E	10, 13	19 (8.6)
65E	92DBA2-65E	10, 13	19 (8.6)
80E	92DBA2-80E	10, 13	19 (8.6)
100E	92DBA2-100E	10, 13	19 (8.6)
125E	92DBA2-125E	10, 13	19 (8.6)
150E	92DBA2-150E	10, 13	19 (8.6)
200E	92DBA2-200E	10, 13	19 (8.6)
<b>121 kV Maximum (115 kV Nominal)</b>			
3	121DBA2-3	10, 13	22 (10)
5E	121DBA2-5E	10, 13	22 (10)
7E	121DBA2-7E	10, 13	22 (10)
10E	121DBA2-10E	10, 13	22 (10)
15E	121DBA2-15E	10, 13	22 (10)
20E	121DBA2-20E	10, 13	22 (10)
25E	121DBA2-25E	10, 13	22 (10)
30E	121DBA2-30E	10, 13	22 (10)
40E	121DBA2-40E	10, 13	22 (10)
50E	121DBA2-50E	10, 13	22 (10)
65E	121DBA2-65E	10, 13	22 (10)
80E	121DBA2-80E	10, 13	22 (10)
100E	121DBA2-100E	10, 13	22 (10)
125E	121DBA2-125E	10, 13	22 (10)
150E	121DBA2-150E	10, 13	22 (10)
200E	121DBA2-200E	10, 13	22 (10)

Ampere Rating	DBA-1 Fuse Units Catalog Number	Curve Reference 36-623	Approximate Shipping Weight Lbs (kg)
<b>145 kV Maximum (138 kV Nominal)</b>			
3	145DBA2-3	10, 13	25 (11.4)
5E	145DBA2-5E	10, 13	25 (11.4)
7E	145DBA2-7E	10, 13	25 (11.4)
10E	145DBA2-10E	10, 13	25 (11.4)
15E	145DBA2-15E	10, 13	25 (11.4)
20E	145DBA2-20E	10, 13	25 (11.4)
25E	145DBA2-25E	10, 13	25 (11.4)
30E	145DBA2-30E	10, 13	25 (11.4)
40E	145DBA2-40E	10, 13	25 (11.4)
50E	145DBA2-50E	10, 13	25 (11.4)
65E	145DBA2-65E	10, 13	25 (11.4)
80E	145DBA2-80E	10, 13	25 (11.4)
100E	145DBA2-100E	10, 13	25 (11.4)
125E	145DBA2-125E	10, 13	25 (11.4)
150E	145DBA2-150E	10, 13	25 (11.4)
200E	145DBA2-200E	10, 13	25 (11.4)

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### Catalog Number Selection

#### Easy to Use, Easy to Order!

Eaton's fuse catalog numbering system makes it easy to order the right fuse. The catalog numbers are easy to remember, unique to each fuse, and are broken down in three descriptive segments: Fuse type, voltage rating and current rating.

These catalog numbers can be entered directly and easily:

- No change in order processing will occur if you use either a style number or its corresponding catalog number. You will get the same fuse

#### Examples:

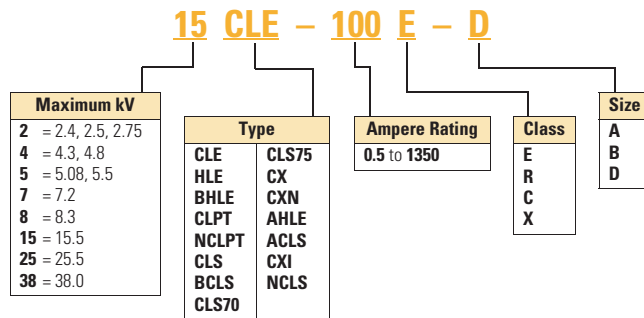
**5CLE-30E**—5.5 max. kV, CLE fuse unit, 30E amperes

**15CXN-45C**—15.5 max. kV, CXN fuse unit, 45C amperes

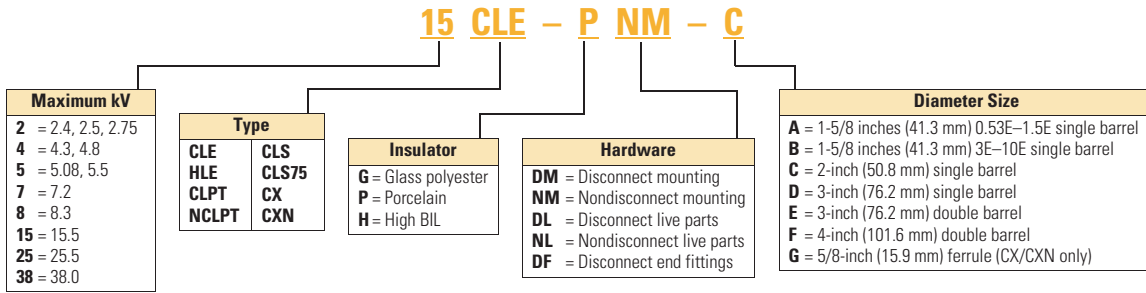
**5CLS-GDM-E**—5.5 max. kV, CLS fuse unit, glass polyester nondisconnect mounting

**CLE-DL-D**—CLE, disconnect live parts Size D

### Current Limiting Fuses



Current Limiting Fuse Accessories





# 3.5

## Power Breakers, Contactors and Fuses

### Current Limiting Fuses

#### Product Selection

#### Type CLE

3



#### Type CLE Current Limiting Fuses 2.75 kV Maximum (2.4 kV Nominal)

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Heritage Product	Indoor/Outdoor	Performance Curves			Catalog Number
					Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
15E	1	50	H	Indoor	56353202	56353302	63931702	2CLE-15E
20E	1	50	H	Indoor	56353202	56353302	63931702	2CLE-20E
25E	1	50	H	Indoor	56353202	56353302	63931702	2CLE-25E
10E	1	50	H	Indoor	53686104	53686204	63931704	2CLE-10E
30E	1	50	H	Indoor	53686104	53686204	63931704	2CLE-30E
40E	1	50	H	Indoor	53686104	53686204	63931704	2CLE-40E
50E	1	50	H	Indoor	53686104	53686204	63931704	2CLE-50E
65E	1	50	H	Indoor	53686104	53686204	63931704	2CLE-65E
80E	1	50	H	Indoor	53686104	53686204	63931704	2CLE-80E
100E	1	50	H	Indoor	53686104	53686204	63931704	2CLE-100E
125E	1	50	H	Indoor	53686104	53686204	63931704	2CLE-125E
150E	1	50	H	Indoor	53686104	53686204	63931704	2CLE-150E
200E	1	50	H	Indoor	53686104	53686204	63931704	2CLE-200E
225E	1	50	H	Indoor	53686104	53686204	63931704	2CLE-225E
250E	2	50	H	Indoor	53690002	53690102	63931802	2CLE-250E
300E	2	50	H	Indoor	53690002	53690102	63931802	2CLE-300E
350X	2	50	H	Indoor	53690002	53690102	63931802	2CLE-350X
400X	2	50	H	Indoor	53690002	53690102	63931802	2CLE-400X
450X	2	50	H	Indoor	53690002	53690102	63931802	2CLE-450X

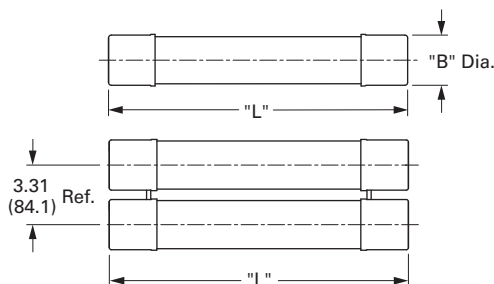
#### Type CLE Mountings and Hardware 2.75 kV Maximum (2.4 kV Nominal)

Ampere Rating	Fuse Mounting Type ①	Voltage BIL (kV)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Mounting (Including Live Parts, End Fittings) ②		Live Parts (Including End Fittings) ②	End Fittings (Disconnect Only)
							Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number	Catalog Number	Catalog Number
15E-25E	Non-disconnect	60	2.00 (50.8)	8.13 (206.5)	9.50 (241.3)	2 (0.91)	2CLE-PNM-C	2CLE-GNM-C	CLE-NL-C	—
	Disconnect	60					2CLE-PDM-C	2CLE-GDM-C	CLE-DL-C	CLE-DF-C
10E-250E	Non-disconnect	60	3.00 (76.2)	7.00 (177.8)	10.90 (276.9)	7 (3.18)	2CLE-PNM-D	2CLE-GNM-D	CLE-NL-D	—
	Disconnect	60					2CLE-PDM-D	2CLE-GDM-D	CLE-DL-D	CLE-DF-D
300E-450E	Non-disconnect	60	3.00 (76.2)	7.00 (177.8)	10.90 (276.9)	15 (6.81)	2CLE-PNM-E	2CLE-GNM-E	CLE-NL-E	—
	Disconnect	60					2CLE-PDM-E	2CLE-GDM-E	CLE-DL-E	CLE-DF-E

#### Fuse Dimensional Details

Approximate Dimensions in Inches (mm)

#### Type CLE Fuse



CLE kV	"L"	"B" Dia.
15E-25E	9.50 (241.3)	2.00 (50.8)
10E-450E	10.90 (276.9)	3.00 (76.2)

#### Notes

- ① See Page V4-T3-127 for diagram of typical mounting.
- ② End fittings supplied only when required.



Type CLE Current Limiting Fuses 5.5 kV Maximum (4.8 kV Nominal)

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Heritage Product	Indoor/Outdoor	Performance Curves			Catalog Number
					Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
15E	1	50	H	Indoor	56353204	56353304	63931702	5CLE-15E
20E	1	50	H	Indoor	56353204	56353304	63931702	5CLE-20E
25E	1	50	H	Indoor	56353204	56353304	63931702	5CLE-25E
10E	1	63	—	Indoor/outdoor	70548501	70548601	70548701	5CLE-10E-D
15E	1	63	—	Indoor/outdoor	70548501	70548601	70548701	5CLE-15E-D
20E	1	63	—	Indoor/outdoor	70548501	70548601	70548701	5CLE-20E-D
25E	1	63	—	Indoor/outdoor	70548501	70548601	70548701	5CLE-25E-D
30E	1	63	—	Indoor/outdoor	70548501	70548601	70548701	5CLE-30E
40E	1	50	—	Indoor/outdoor	70545801	70545901	70546701	5CLE-40E
50E	1	50	—	Indoor/outdoor	70545801	70545901	70546701	5CLE-50E
65E	1	50	—	Indoor/outdoor	70545801	70545901	70546701	5CLE-65E
80E	1	50	—	Indoor/outdoor	70545801	70545901	70546701	5CLE-80E
100E	1	50	—	Indoor/outdoor	70545801	70545901	70546701	5CLE-100E
125E	1	50	—	Indoor/outdoor	70545801	70545901	70546701	5CLE-125E
150E	1	63	—	Indoor/outdoor	70545801	70545901	70547601	5CLE-150E
175E	1	63	—	Indoor/outdoor	70545801	70545901	70547601	5CLE-175E
200E	1	63	—	Indoor/outdoor	70545801	70545901	70547601	5CLE-200E
250E	1	63	—	Indoor/outdoor	70545801	70545901	70547601	5CLE-250E
300E	2	63	—	Indoor/outdoor	70546001	70546101	70547601	5CLE-300E
350E	2	63	—	Indoor/outdoor	70546001	70546101	70547601	5CLE-350E
400E	2	63	—	Indoor/outdoor	70546001	70546101	70547601	5CLE-400E
450E	2	63	—	Indoor/outdoor	70546001	70546101	70547601	5CLE-450E
600E	2	40	—	Indoor	62908902	62908903	62908904	5CLE-600E
750E	2	40	—	Indoor	62908902	62908903	62908904	5CLE-750E
1100E	4	31	—	Indoor	62908902	62908903	62908904	5CLE-1100E
1350E	4	31	—	Indoor	62908902	62908903	62908904	5CLE-1350E

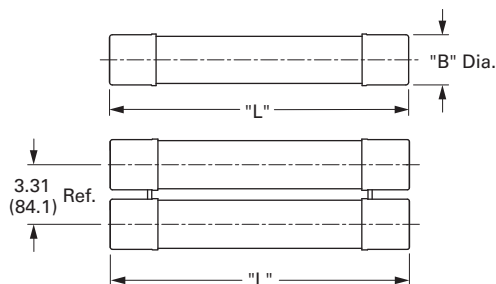
Type CLE Mountings and Hardware 5.5 kV Maximum (4.8 kV Nominal)

Ampere Rating	Fuse Mounting Type ①	Voltage BIL (kV)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Mounting (Including Live Parts, End Fittings) ②		Live Parts (Including End Fittings) ②	End Fittings (Disconnect Only)
							Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number	Catalog Number	Catalog Number
10E-D-25E-D 30E-250E	Non-disconnect	60	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	9 (4.09)	5CLE-PNM-D	5CLE-GNM-D	CLE-NL-D	—
	Disconnect	60					5CLE-PDM-D	5CLE-GDM-D	CLE-DL-D	CLE-DF-D
15E-25E	Non-disconnect	60	2.00 (50.8)	11.50 (292.1)	12.90 (327.7)	3 (1.36)	5CLE-PNM-C	5CLE-GNM-C	CLE-NL-C	—
	Disconnect	60					5CLE-PDM-C	5CLE-GDM-C	CLE-DL-C	CLE-DF-C
300E-450E	Non-disconnect	60	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	19 (8.63)	5CLE-PNM-E	5CLE-GNM-E	CLE-NL-E	—
	Disconnect	60					5CLE-PDM-E	5CLE-GDM-E	CLE-DL-E	CLE-DF-E
600E and 750E	Consult factory	60	4.00 (101.6)	N/A	N/A	40 (18.16)	—	—	—	—
1100E and 1350E	Consult factory	—	4.00 (101.6)	N/A	N/A	80 (36.32)	—	—	—	—

Fuse Dimensional Details

Approximate Dimensions in Inches (mm)

Type CLE Fuse



CLE kV	"L"	"B" Dia.
15E-25E	12.90 (327.7)	2.00 (50.8)
10E-450E	17.90 (454.7)	3.00 (76.2)

Notes

- ① See Page V4-T3-127 for diagram of typical mounting.
- ② End fittings supplied only when required.



#### Type CLE Current Limiting Fuses 8.3 kV Maximum (7.2 kV Nominal)

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Heritage Product	Indoor/Outdoor	Performance Curves			Catalog Number
					Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
15E	1	50	H	Indoor	56353204	56353304	63931703	8CLE-15E
20E	1	50	H	Indoor	56353204	56353304	63931703	8CLE-20E
25E	1	50	H	Indoor	56353204	56353304	63931703	8CLE-25E
10E	1	50	—	Indoor/outdoor	70548501	70548601	70548801	8CLE-10E-D
15E	1	50	—	Indoor/outdoor	70548501	70548601	70548801	8CLE-15E-D
20E	1	50	—	Indoor/outdoor	70548501	70548601	70548801	8CLE-20E-D
25E	1	50	—	Indoor/outdoor	70548501	70548601	70548801	8CLE-25E-D
30E	1	50	—	Indoor/outdoor	70548501	70548601	70548801	8CLE-30E
40E	1	50	—	Indoor/outdoor	70546201	70546301	70547301	8CLE-40E
50E	1	50	—	Indoor/outdoor	70546201	70546301	70547301	8CLE-50E
65E	1	50	—	Indoor/outdoor	70546201	70546301	70547301	8CLE-65E
80E	1	50	—	Indoor/outdoor	70546201	70546301	70547301	8CLE-80E
100E	1	50	—	Indoor/outdoor	70546201	70546301	70547301	8CLE-100E
125E	1	50	—	Indoor/outdoor	70546201	70546301	70547301	8CLE-125E
150E	1	50	—	Indoor/outdoor	70546201	70546301	70547301	8CLE-150E
175E	1	50	—	Indoor/outdoor	70546201	70546301	70547301	8CLE-175E
200E	2	50	—	Indoor/outdoor	70546401	70546501	70547301	8CLE-200E
250E	2	50	—	Indoor/outdoor	70546401	70546501	70547301	8CLE-250E
300E	2	50	—	Indoor/outdoor	70546401	70546501	70547301	8CLE-300E
350E	2	50	—	Indoor/outdoor	70546401	70546501	70547301	8CLE-350E

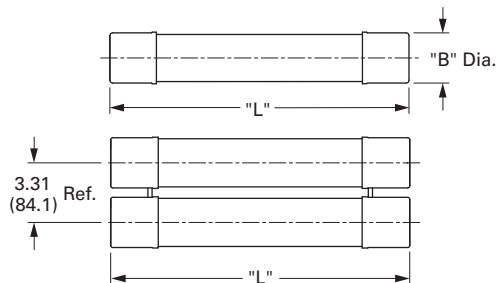
#### Type CLE Mountings and Hardware 8.3 kV Maximum (7.2 kV Nominal)

Ampere Rating	Fuse Mounting Type ①	Voltage BIL (kV)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Mounting (Including Live Parts, End Fittings) ②		Live Parts (Including End Fittings) ②	End Fittings (Disconnect Only)
							Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number		
15E-25E	Non-disconnect	75	2.00 (50.8)	14.00 (355.6)	15.50 (393.7)	3 (1.36)	8CLE-PNM-C	8CLE-GNM-C	CLE-NL-C	—
	Disconnect	75					8CLE-PDM-C	8CLE-GDM-C	CLE-DL-C	CLE-DF-C
10E-D-25E-D 30E-175E	Non-disconnect	75	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	9 (4.09)	8CLE-PNM-D	8CLE-GNM-D	CLE-NL-D	—
	Disconnect	75					8CLE-PDM-D	8CLE-GDM-D	CLE-DL-D	CLE-DF-D
200E-350E	Non-disconnect	75	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	19 (8.63)	8CLE-PNM-E	8CLE-GNM-E	CLE-NL-E	—
	Disconnect	75					8CLE-PDM-E	8CLE-GDM-E	CLE-DL-E	CLE-DF-E

#### Fuse Dimensional Details

Approximate Dimensions in Inches (mm)

#### Type CLE Fuse



CLE kV	"L"	"B" Dia.
15E-25E	15.50 (393.7)	2.00 (50.8)
10E-350E	17.90 (454.7)	3.00 (76.2)

#### Notes

- ① See Page V4-T3-127 for diagram of typical mounting.
- ② End fittings supplied only when required.



**Type CLE Current Limiting Fuses 15.5 kV Maximum (4.8 kV Nominal)**

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Heritage Product	Indoor/Outdoor	Performance Curves			Catalog Number
					Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
15E	1	31.5	H	Indoor	56353204	56353304	63931703	15CLE-15E
20E	1	31.5	H	Indoor	56353204	56353304	63931703	15CLE-20E
25E	1	31.5	H	Indoor	56353204	56353304	63931703	15CLE-25E
10E	1	63	—	Indoor/outdoor	70548501	70548601	70548802	15CLE-10E-D
15E	1	63	—	Indoor/outdoor	70548501	70548601	70548802	15CLE-15E-D
20E	1	63	—	Indoor/outdoor	70548501	70548601	70548802	15CLE-20E-D
25E	1	63	—	Indoor/outdoor	70548501	70548601	70548802	15CLE-25E-D
30E	1	63	—	Indoor/outdoor	70548501	70548601	70548802	15CLE-30E
40E	1	63	—	Indoor/outdoor	70546801	70546901	70547501	15CLE-40E
50E	1	63	—	Indoor/outdoor	70546801	70546901	70547501	15CLE-50E
65E	1	63	—	Indoor/outdoor	70546801	70546901	70547501	15CLE-65E
80E	1	63	②	Indoor/outdoor	70546801	70546901	70547501	15CLE-80E
100E	1	63	②	Indoor/outdoor	70546801	70546901	70547501	15CLE-100E
125E	1	63	②	Indoor/outdoor	70546801	70546901	70547501	15CLE-125E
150E	1	63	②	Indoor/outdoor	70546801	70546901	70547501	15CLE-150E
175E	2	63	②	Indoor/outdoor	70547001	70547101	70547501	15CLE-175E
200E	2	63	②	Indoor/outdoor	70547001	70547101	70547501	15CLE-200E
250E	2	63	②	Indoor/outdoor	70547001	70547101	70547501	15CLE-250E
300E	2	63	②	Indoor/outdoor	70547001	70547101	70547501	15CLE-300E
80E	2	85	H ②	Indoor	59878302	59878402	63931604	15CLE2-80E
100E	2	85	H ②	Indoor	59878302	59878402	63931604	15CLE2-100E
125X	2	85	H ②	Indoor	59878302	59878402	63931604	15CLE2-125X
150E	3	50	H ②	Indoor	59878302	59878402	63931604	15CLE3-150E
175E/200X	3	50	H ②	Indoor	59878302	59878402	63931604	15CLE3-175E/200X

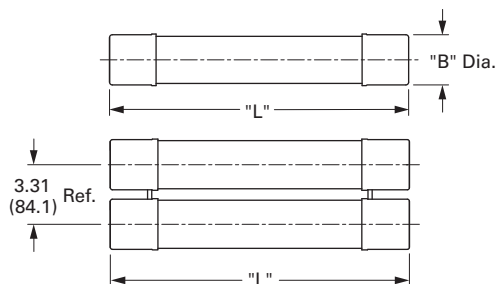
**Type CLE Mountings and Hardware 15.5 kV Maximum (4.8 kV Nominal)**

Ampere Rating	Fuse Mounting Type ①	Voltage BIL (kV)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Mounting (Including Live Parts, End Fittings) ②		Live Parts (Including End Fittings) ②	End Fittings (Disconnect Only)
							Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number	Catalog Number	Catalog Number
15E–25E	Non-disconnect	95	2.00 (50.8)	20.00 (508.0)	21.50 (546.1)	4.5 (2.04)	15CLE-PNM-C	15CLE-GNM-C	CLE-NL-D	—
		110					15CLE-HPNM-C	—	—	—
	Disconnect	95	15CLE-PDM-C				15CLE-GDM-C	CLE-DL-C	CLE-DF-C	
		110	15CLE-HPDM-C				—	—	—	
10E-D–25E-D 30E–150E	Non-disconnect	95	3.00 (76.2)	20.00 (508.0)	23.90 (607.1)	11 (4.99)	15CLE-PNM-D	15CLE-GNM-D	CLE-NL-D	—
		110					15CLE-HPM-D	—	—	—
	Disconnect	95	15CLE-PDM-D				15CLE-GDM-D	CLE-DL-D	CLE-DF-D	
		110	15CLE-HPDM-D				—	—	—	
175E–300E	Non-disconnect	110	3.00 (76.2)	20.00 (508.0)	23.90 (607.1)	23 (10.44)	15CLE-PNM-E	—	CLE-DL-E	CLE-DF-E
	Disconnect	110					15CLE-PDM-E	—	—	—

**Fuse Dimensional Details**

Approximate Dimensions in Inches (mm)

**Type CLE Fuse**



CLE kV	"L"	"B" Dia.
15E–25E	21.50 (546.1)	2.00 (50.8)
10E–300E	23.90 (607.1)	3.00 (76.2)

**Notes**

- ① See Page V4-T3-127 for diagram of typical mounting.
- ② For mountings, consult factory.
- ③ End fittings supplied only when required.

#### Type HLE

3



#### Type HLE Current Limiting Fuses 5.5 kV Maximum (4.8 kV Nominal) Interrupting Rating 63 (kA rms Sym.)

Current Rating (Amperes)	Barrel Number	Indoor/Outdoor	Performance Curves			Catalog Number	Bolt-In Ferrule Catalog Number	AMPGARD Catalog Number
			Minimum Melting Time	Total Clearing Time	Peak Let-Through Current			
10E	1	Indoor/outdoor	70548507	70548607	70548703	5HLE-10E	5BHLE-10E	5AHLE-10E
15E	1	Indoor/outdoor	70548507	70548607	70548703	5HLE-15E	5BHLE-15E	5AHLE-15E
20E	1	Indoor/outdoor	70548507	70548607	70548703	5HLE-20E	5BHLE-20E	5AHLE-20E
25E	1	Indoor/outdoor	70548507	70548607	70548703	5HLE-25E	5BHLE-25E	5AHLE-25E
30E	1	Indoor/outdoor	70548507	70548607	70548703	5HLE-30E	5BHLE-30E	5AHLE-30E
40E	1	Indoor/outdoor	70545805	70545905	70547603	5HLE-40E	5BHLE-40E	5AHLE-40E
50E	1	Indoor/outdoor	70545805	70545905	70547603	5HLE-50E	5BHLE-50E	5AHLE-50E
65E	1	Indoor/outdoor	70545805	70545905	70547603	5HLE-65E	5BHLE-65E	5AHLE-65E
80E	1	Indoor/outdoor	70545805	70545905	70547603	5HLE-80E	5BHLE-80E	5AHLE-80E
100E	1	Indoor/outdoor	70545805	70545905	70547603	5HLE-100E	5BHLE-100E	5AHLE-100E
125E	1	Indoor/outdoor	70545805	70545905	70547603	5HLE-125E	5BHLE-125E	5AHLE-125E
150E	1	Indoor/outdoor	70545805	70545905	70547603	5HLE-150E	5BHLE-150E	5AHLE-150E
175E	1	Indoor/outdoor	70545805	70545905	70547603	5HLE-175E	5BHLE-175E	5AHLE-175E
200E	1	Indoor/outdoor	70545805	70545905	70547603	5HLE-200E	5BHLE-200E	5AHLE-200E
250E	1	Indoor/outdoor	70545805	70545905	70547603	5HLE-250E	5BHLE-250E	5AHLE-250E
300E	2	Indoor/outdoor	70546005	70546105	70547603	5HLE-300E	5BHLE-300E	5AHLE-300E
350E	2	Indoor/outdoor	70546005	70546105	70547603	5HLE-350E	5BHLE-350E	5AHLE-350E
400E	2	Indoor/outdoor	70546005	70546105	70547603	5HLE-400E	5BHLE-400E	5AHLE-400E
450E	2	Indoor/outdoor	70546005	70546105	70547603	5HLE-450E	5BHLE-450E	5AHLE-450E

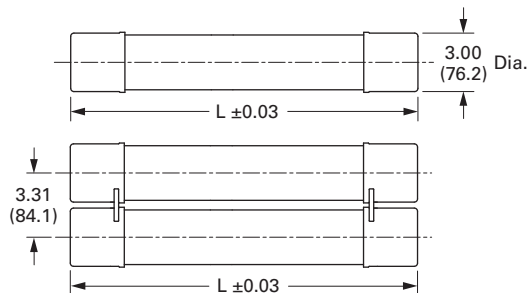
#### Type HLE Mountings and Hardware 5.5 kV Maximum (4.8 kV Nominal)

Ampere Rating	Fuse Mounting Type ①	Voltage BIL (kV)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Mounting (Including Live Parts, End Fittings) ②		Live Parts (Including End Fittings) ②	End Fittings (Disconnect Only)
							Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number	Catalog Number	Catalog Number
10E–250E	Non-disconnect	60	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	5HLE-PNM-D	5HLE-GNM-D	CLE-NL-D	—
	Disconnect	60					5HLE-PDM-D	5HLE-GDM-D	CLE-DL-D	CLE-DF-D
300E–450E	Non-disconnect	60	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	17 (7.72)	5HLE-PNM-E	5HLE-GNM-E	CLE-NL-E	—
	Disconnect	60					5HLE-PDM-E	5HLE-GDM-E	CLE-DL-E	CLE-DF-D

#### Fuse Dimensional Details

Approximate Dimensions in Inches (mm)

#### Type HLE Fuse



HLE kV	L ± 0.03
5.5	15.88 (403.4)

#### Notes

- ① See Page V4-T3-127 for diagram of typical mounting.
- ② End fittings supplied only when required.



**Type HLE Current Limiting Fuses 8.3 kV Maximum (7.2 kV Nominal) Interrupting Rating 50 (kA Sym.)**

Current Rating (Amperes)	Barrel Number	Indoor/Outdoor	Performance Curves			Catalog Number	Bolt-In Ferrule Catalog Number	AMPGARD Catalog Number
			Minimum Melting Time	Total Clearing Time	Peak Let-Through Current			
10E	1	Indoor/outdoor	70548507	70548607	70548804	8HLE-10E	8BHLE-10E	8AHLE-10E
15E	1	Indoor/outdoor	70548507	70548607	70548804	8HLE-15E	8BHLE-15E	8AHLE-15E
20E	1	Indoor/outdoor	70548507	70548607	70548804	8HLE-20E	8BHLE-20E	8AHLE-20E
25E	1	Indoor/outdoor	70548507	70548607	70548804	8HLE-25E	8BHLE-25E	8AHLE-25E
30E	1	Indoor/outdoor	70548507	70548607	70548804	8HLE-30E	8BHLE-30E	8AHLE-30E
40E	1	Indoor/outdoor	70546203	70546303	70547201	8HLE-40E	8BHLE-40E	8AHLE-40E
50E	1	Indoor/outdoor	70546203	70546303	70547201	8HLE-50E	8BHLE-50E	8AHLE-50E
65E	1	Indoor/outdoor	70546203	70546303	70547201	8HLE-65E	8BHLE-65E	8AHLE-65E
80E	1	Indoor/outdoor	70546203	70546303	70547201	8HLE-80E	8BHLE-80E	8AHLE-80E
100E	1	Indoor/outdoor	70546203	70546303	70547201	8HLE-100E	8BHLE-100E	8AHLE-100E
125E	1	Indoor/outdoor	70546203	70546303	70547201	8HLE-125E	8BHLE-125E	8AHLE-125E
150E	1	Indoor/outdoor	70546203	70546303	70547201	8HLE-150E	8BHLE-150E	8AHLE-150E
175E	1	Indoor/outdoor	70546203	70546303	70547201	8HLE-175E	8BHLE-175E	8AHLE-175E
200E	2	Indoor/outdoor	70546403	70546503	70547201	8HLE-200E	8BHLE-200E	8AHLE-200E
250E	2	Indoor/outdoor	70546403	70546503	70547201	8HLE-250E	8BHLE-250E	8AHLE-250E
300E	2	Indoor/outdoor	70546403	70546503	70547201	8HLE-300E	8BHLE-300E	8AHLE-300E
350E	2	Indoor/outdoor	70546403	70546503	70547201	8HLE-350E	8BHLE-350E	8AHLE-350E

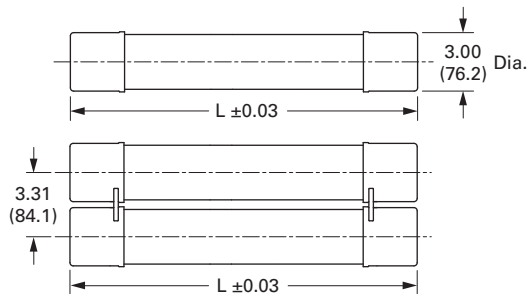
**Type HLE Mountings and Hardware 8.3 kV Maximum (7.2 kV Nominal)**

Ampere Rating	Fuse Mounting Type ①	Voltage BIL (kV)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Mounting (Including Live Parts, End Fittings) ②		Live Parts (Including End Fittings) ②	End Fittings (Disconnect Only)
							Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number	Catalog Number	Catalog Number
10E–175E	Non-disconnect	75	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	8HLE-PNM-D	8HLE-GNM-D	CLE-NL-D	—
	Disconnect	75					8HLE-PDM-D	8HLE-GDM-D	CLE-DL-D	CLE-DF-D
200E–350E	Non-disconnect	75					8HLE-PNM-E	8HLE-GNM-E	CLE-NL-E	—
	Disconnect	75					8HLE-PDM-E	8HLE-GDM-E	CLE-DL-E	CLE-DF-E

**Fuse Dimensional Details**

Approximate Dimensions in Inches (mm)

**Type HLE Fuse**



HLE kV	L ± 0.03
8.3	15.88 (403.4)

**Notes**

- ① See Page V4-T3-127 for diagram of typical mounting.
- ② End fittings supplied only when required.



#### Type HLE Current Limiting Fuses 15.5 kV Maximum (14.4 kV Nominal)

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Indoor/Outdoor	Performance Curves		Peak Let-Through Current	Catalog Number	Bolt-In Ferrule Catalog Number
				Minimum Melting Time	Total Clearing Time			
10E	1	63	Indoor/outdoor	70548507	70548607	70548805	15HLE-10E	15BHLE-10E
15E	1	63	Indoor/outdoor	70548507	70548607	70548805	15HLE-15E	15BHLE-15E
20E	1	63	Indoor/outdoor	70548507	70548607	70548805	15HLE-20E	15BHLE-20E
25E	1	63	Indoor/outdoor	70548507	70548607	70548805	15HLE-25E	15BHLE-25E
30E	1	63	Indoor/outdoor	70548507	70548607	70548805	15HLE-30E	15BHLE-30E
40E	1	63	Indoor/outdoor	70546601	70546701	70547401	15HLE-40E	15BHLE-40E
50E	1	63	Indoor/outdoor	70546601	70546701	70547401	15HLE-50E	15BHLE-50E
65E	1	63	Indoor/outdoor	70546601	70546701	70547401	15HLE-65E	15BHLE-65E
80E	1	63	Indoor/outdoor	70546601	70546701	70547401	15HLE-80E	15BHLE-80E
100E	1	63	Indoor/outdoor	70546601	70546701	70547401	15HLE-100E	15BHLE-100E
125E	1	63	Indoor/outdoor	70546601	70546701	70547401	15HLE-125E	15BHLE-125E
150E	2	63	Indoor/outdoor	70546601	70546701	70547401	15HLE-150E	15BHLE-150E
175E	2	63	Indoor/outdoor	70546601	70546701	70547401	15HLE-175E	15BHLE-175E
200E	2	63	Indoor/outdoor	70546601	70546701	70547401	15HLE-200E	15BHLE-200E
250E	2	63	Indoor/outdoor	70546601	70546701	70547401	15HLE-250E	15BHLE-250E

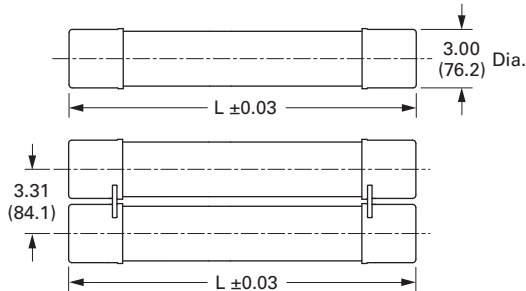
#### Type HLE Mountings and Hardware 15.5 kV Maximum (14.4 kV Nominal)

Ampere Rating	Fuse Mounting Type ①	Voltage BIL (kV)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Mounting (Including Live Parts, End Fittings) ②		Live Parts (Including End Fittings) ②	End Fittings (Disconnect Only)
							Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number	Catalog Number	Catalog Number
10E-175E	Non-disconnect	95	3.00 (76.2)	15.00 (381.0)	18.90 (480.1)	10 (4.54)	15HLE-PNM-D	15HLE-GNM-D	CLE-NL-D	—
	Disconnect	95					15HLE-PDM-D	15HLE-GDM-D	CLE-DL-D	CLE-DF-D
150E-250E	Non-disconnect	95	3.00 (76.2)	15.00 (381.0)	18.90 (480.1)	21 (9.53)	15HLE-PNM-E	—	CLE-NL-E	—
	Disconnect	95					15HLE-PDM-E	—	CLE-DL-E	CLE-DF-E

#### Fuse Dimensional Details

Approximate Dimensions in Inches (mm)

#### Type HLE Fuse



HLE kV	L ± 0.03
15.5	18.88 (479.6)

#### Notes

- ① See Page V4-T3-127 for diagram of typical mounting.
- ② End fittings supplied only when required.

**Type BHLE**

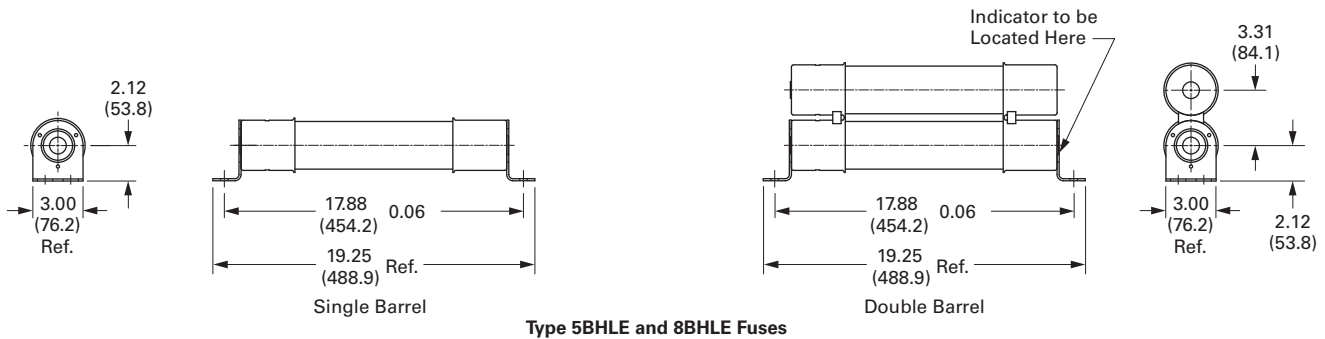
Approximate Dimensions in Inches (mm)

**Type BHLE Current Limiting Fuses 5.5 kV Maximum (4.8 kV Nominal), Indoor, Bolt-In**

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Catalog Number
						Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
10E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70548507	70548607	70548703	<b>5BHLE-10E</b>
15E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70548507	70548607	70548703	<b>5BHLE-15E</b>
20E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70548507	70548607	70548703	<b>5BHLE-20E</b>
25E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70548507	70548607	70548703	<b>5BHLE-25E</b>
30E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70548507	70548607	70548703	<b>5BHLE-30E</b>
40E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70545805	70545905	70547603	<b>5BHLE-40E</b>
50E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70545805	70545905	70547603	<b>5BHLE-50E</b>
65E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70545805	70545905	70547603	<b>5BHLE-65E</b>
80E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70545805	70545905	70547603	<b>5BHLE-80E</b>
100E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70545805	70545905	70547603	<b>5BHLE-100E</b>
125E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70545805	70545905	70547603	<b>5BHLE-125E</b>
150E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70545805	70545905	70547603	<b>5BHLE-150E</b>
175E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70545805	70545905	70547603	<b>5BHLE-175E</b>
200E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70545805	70545905	70547603	<b>5BHLE-200E</b>
250E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70545805	70545905	70547603	<b>5BHLE-250E</b>
300E	2	63	3.00 (76.2)	15.90 (403.9)	17 (7.72)	70546005	70546105	70547603	<b>5BHLE-300E</b>
350E	2	63	3.00 (76.2)	15.90 (403.9)	17 (7.72)	70546005	70546105	70547603	<b>5BHLE-350E</b>
400E	2	63	3.00 (76.2)	15.90 (403.9)	17 (7.72)	70546005	70546105	70547603	<b>5BHLE-400E</b>
450E	2	63	3.00 (76.2)	15.90 (403.9)	17 (7.72)	70546005	70546105	70547603	<b>5BHLE-450E</b>

**Fuse Dimensional Details**

**Type BHLE Fuse**





# 3.5

## Power Breakers, Contactors and Fuses

### Current Limiting Fuses

Approximate Dimensions in Inches (mm)

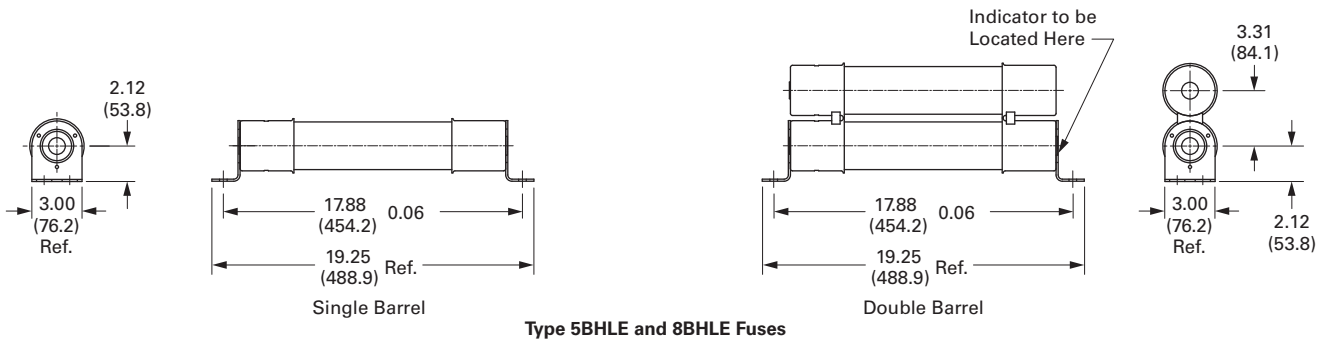
3

#### Type BHLE Current Limiting Fuses 8.3 kV Maximum (7.2 kV Nominal), Indoor, Bolt-In

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Catalog Number
						Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
10E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70548507	70548607	70548804	8BHLE-10E
15E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70548507	70548607	70548804	8BHLE-15E
20E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70548507	70548607	70548804	8BHLE-20E
25E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70548507	70548607	70548804	8BHLE-25E
30E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70548507	70548607	70548804	8BHLE-30E
40E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70546203	70546303	70547201	8BHLE-40E
50E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70546203	70546303	70547201	8BHLE-50E
65E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70546203	70546303	70547201	8BHLE-65E
80E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70546203	70546303	70547201	8BHLE-80E
100E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70546203	70546303	70547201	8BHLE-100E
125E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70546203	70546303	70547201	8BHLE-125E
150E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70546203	70546303	70547201	8BHLE-150E
175E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70546203	70546303	70547201	8BHLE-175E
200E	2	50	3.00 (76.2)	15.90 (403.9)	17 (7.72)	70546403	70546503	70547201	8BHLE-200E
250E	2	50	3.00 (76.2)	15.90 (403.9)	17 (7.72)	70546403	70546503	70547201	8BHLE-250E
300E	2	50	3.00 (76.2)	15.90 (403.9)	17 (7.72)	70546403	70546503	70547201	8BHLE-300E
350E	2	50	3.00 (76.2)	15.90 (403.9)	17 (7.72)	70546403	70546503	70547201	8BHLE-350E

#### Fuse Dimensional Details

##### Type BHLE Fuse



Approximate Dimensions in Inches (mm)

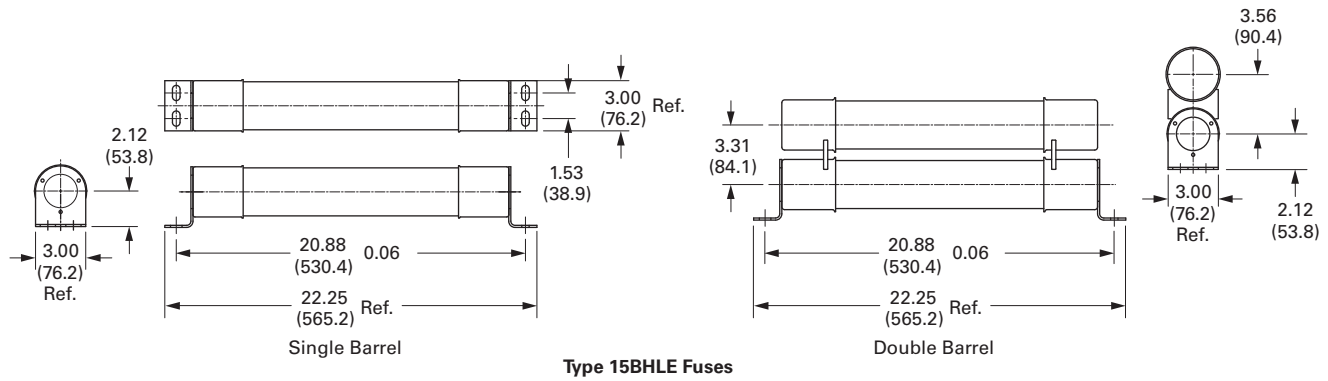
**Type BHLE Current Limiting Fuses 15.5 kV Maximum (14.4 kV Nominal), Indoor/Outdoor, Bolt-In**

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Catalog Number
						Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
10E	1	63	3.00 (76.2)	18.90 (480.1)	10 (4.54)	70548507	70548607	70548805	<b>15BHLE-10E</b>
15E	1	63	3.00 (76.2)	18.90 (480.1)	10 (4.54)	70548507	70548607	70548805	<b>15BHLE-15E</b>
20E	1	63	3.00 (76.2)	18.90 (480.1)	10 (4.54)	70548507	70548607	70548805	<b>15BHLE-20E</b>
25E	1	63	3.00 (76.2)	18.90 (480.1)	10 (4.54)	70548507	70548607	70548805	<b>15BHLE-25E</b>
30E	1	63	3.00 (76.2)	18.90 (480.1)	10 (4.54)	70548507	70548607	70548805	<b>15BHLE-30E</b>
40E	1	63	3.00 (76.2)	18.90 (480.1)	10 (4.54)	70546601	70546701	70547401	<b>15BHLE-40E</b>
50E	1	63	3.00 (76.2)	18.90 (480.1)	10 (4.54)	70546601	70546701	70547401	<b>15BHLE-50E</b>
65E	1	63	3.00 (76.2)	18.90 (480.1)	10 (4.54)	70546601	70546701	70547401	<b>15BHLE-65E</b>
80E	1	63	3.00 (76.2)	18.90 (480.1)	10 (4.54)	70546601	70546701	70547401	<b>15BHLE-80E</b>
100E	1	63	3.00 (76.2)	18.90 (480.1)	10 (4.54)	70546601	70546701	70547401	<b>15BHLE-100E</b>
125E	1	63	3.00 (76.2)	18.90 (480.1)	10 (4.54)	70546601	70546701	70547401	<b>15BHLE-125E</b>
150E	2	63	3.00 (76.2)	18.90 (480.1)	21 (9.53)	70546601	70546701	70547401	<b>15BHLE-150E</b>
175E	2	63	3.00 (76.2)	18.90 (480.1)	21 (9.53)	70546601	70546701	70547401	<b>15BHLE-175E</b>
200E	2	63	3.00 (76.2)	18.90 (480.1)	21 (9.53)	70546601	70546701	70547401	<b>15BHLE-200E</b>
250E	2	63	3.00 (76.2)	18.90 (480.1)	21 (9.53)	70546601	70546701	70547401	<b>15BHLE-250E</b>

3

**Fuse Dimensional Details**

**Type BHLE Fuse**



## Type HCL

3

## Type HCL Current Limiting Fuses 5.5 kV Maximum (4.8 kV Nominal), Indoor

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Approximate Shipping Weight Lbs (kg)	Mounting Type	Live Parts (Includes End Fittings) Catalog Number	Performance Curves			Catalog Number
								Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
10E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70548505	70548605	70548702	5HCL-10E
15E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70548505	70548605	70548702	5HCL-15E
20E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70548505	70548605	70548702	5HCL-20E
25E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70548505	70548605	70548702	5HCL-25E
30E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70548505	70548605	70548702	5HCL-30E
40E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70545803	70545903	70547602	5HCL-40E
50E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70545803	70545903	70547602	5HCL-50E
65E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70545803	70545903	70547602	5HCL-65E
80E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70545803	70545903	70547602	5HCL-80E
100E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70545803	70545903	70547602	5HCL-100E
125E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70545803	70545903	70547602	5HCL-125E
150E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70545803	70545903	70547602	5HCL-150E
200E	1	63	3.00 (76.2)	Clip-lock	10 (4.54)	Non-disconnect	HCL-NL-1	70545803	70545903	70547602	5HCL-200E
250E	1	63	3.00 (76.2)	Clip-lock	10 (4.54)	Non-disconnect	HCL-NL-1	70545803	70545903	70547602	5HCL-250E
300E	2	63	3.00 (76.2)	Clip-lock	20 (9.08)	Non-disconnect	HCL-NL-1	70546003	70516103	70547602	5HCL-300E
400E	2	63	3.00 (76.2)	Clip-lock	20 (9.08)	Non-disconnect	HCL-NL-1	70546003	70516103	70547602	5HCL-400E
450E	2	63	3.00 (76.2)	Clip-lock	20 (9.08)	Non-disconnect	HCL-NL-1	70546003	70516103	70547602	5HCL-450E
500E	2	63	3.00 (76.2)	Clip-lock	20 (9.08)	Non-disconnect	HCL-NL-1	66703401	66703501	66703701	5HCL-500E
600E	2	63	3.00 (76.2)	Clip-lock	20 (9.08)	Non-disconnect	HCL-NL-1	66703401	66703501	66703701	5HCL-600E
750E	3	63	3.00 (76.2)	Bolt-in	30 (13.62)	—	—	66703401	66703501	66703701	5HCL-750E
	3	63	3.00 (76.2)	Bolt-in	30 (13.62)	—	—	66703401	66703501	66703701	5BHCL-750E
900E	3	63	3.00 (76.2)	Bolt-in	30 (13.62)	—	—	66703401	66703501	66703701	5HCL-900E
	3	63	3.00 (76.2)	Bolt-in	30 (13.62)	—	—	66703401	66703501	66703701	5BHCL-900E

## Type HCL Current Limiting Fuses (15.5 kV Maximum, 14.4 kV Nominal), Indoor

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Approximate Shipping Weight Lbs (kg)	Mounting Type	Live Parts (Includes End Fittings) Catalog Number	Performance Curves			Catalog Number
								Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
10E	1	63	3.00 (76.2)	Clip-lock	10 (4.54)	Non-disconnect	HCL-NL-1	70548503	70548603	70548803	15HCL-10E
15E	1	63	3.00 (76.2)	Clip-lock	10 (4.54)	Non-disconnect	HCL-NL-1	70548503	70548603	70548803	15HCL-15E
20E	1	63	3.00 (76.2)	Clip-lock	10 (4.54)	Non-disconnect	HCL-NL-1	70548503	70548603	70548803	15HCL-20E
25E	1	63	3.00 (76.2)	Clip-lock	10 (4.54)	Non-disconnect	HCL-NL-1	70548503	70548603	70548803	15HCL-25E
30E	1	63	3.00 (76.2)	Clip-lock	10 (4.54)	Non-disconnect	HCL-NL-1	70548503	70548603	70548803	15HCL-30E
40E	1	63	3.00 (76.2)	Clip-lock	10 (4.54)	Non-disconnect	HCL-NL-1	66703201	66703301	70547402	15HCL-40E
50E	1	63	3.00 (76.2)	Clip-lock	10 (4.54)	Non-disconnect	HCL-NL-1	66703201	66703301	70547402	15HCL-50E
65E	1	50	3.00 (76.2)	Clip-lock	12 (5.45)	Non-disconnect	HCL-NL-1	66703201	66703301	70547402	15HCL-65E
80E	1	50	3.00 (76.2)	Clip-lock	12 (5.45)	Non-disconnect	HCL-NL-1	66703201	66703301	70547402	15HCL-80E
100E	1	50	3.00 (76.2)	Clip-lock	12 (5.45)	Non-disconnect	HCL-NL-1	66703201	66703301	70547402	15HCL-100E
125E	1	50	3.00 (76.2)	Clip-lock	12 (5.45)	Non-disconnect	HCL-NL-1	66703201	66703301	70547402	15HCL-125E
150E	2	50	3.00 (76.2)	Clip-lock	24 (10.90)	Non-disconnect	HCL-NL-1	66703201	66703301	70547402	15HCL-150E
200E	2	50	3.00 (76.2)	Clip-lock	24 (10.90)	Non-disconnect	HCL-NL-1	66703201	66703301	70547402	15HCL-200E
250E	2	50	3.00 (76.2)	Clip-lock	24 (10.90)	Non-disconnect	HCL-NL-1	66703201	66703301	70547402	15HCL-250E
300E	2	50	3.00 (76.2)	Clip-lock	24 (10.90)	Non-disconnect	HCL-NL-1	66703201	66703301	70547402	15HCL-300E

**Note**

Approximate Dimensions in Inches (mm).

**Fuse Dimensional Details**

Approximate Dimensions in Inches (mm)

**5.5 and 15.5 kV Clip Lock Mounted**

Ampere Rating	Number of Barrels	Figure Number	A	B	C	Interrupting Rating rms (kA Sym.)
<b>5.5 kV Maximum—Clip Lock Style—15.25-Inch (387.4 mm) Clip Centers—3.00-Inch (76.2 mm) Barrel Diameter</b>						
10E–150E	1	A	16.81 (427.0)	16.12 (409.4)	①	63
<b>5.5 kV Maximum—Clip Lock Style—21.25-Inch (539.8 mm) Clip Centers—3.00-Inch (76.2 mm) Barrel Diameter</b>						
200E–600E	1	A	22.81 (579.4)	22.12 (561.8)	①	63

**15.5 kV Clip Lock Mounted**

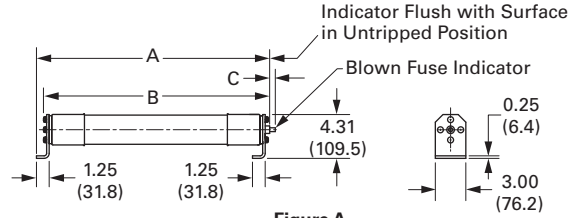
Ampere Rating	Number of Barrels	Figure Number	A	B	C	Interrupting Rating rms (kA Sym.)
<b>15.5 kV Maximum—Clip Lock Style—21.25-Inch (539.8 mm) Clip Centers—3.00-Inch (76.2 mm) Barrel Diameter</b>						
65E–125E	1	A	22.81 (579.4)	22.12 (561.8)	①	63
150E–300E	2	B	22.81 (579.4)	22.12 (561.8)	①	50
<b>15.5 kV Maximum—Clip Lock Style—18.25-Inch (463.6 mm) Clip Centers—3.00-Inch (76.2 mm) Barrel Diameter</b>						
10E–50E	1	A	19.81 (503.2)	19.12 (485.6)	①	63

**Bolt-In Series—5.5 kV**

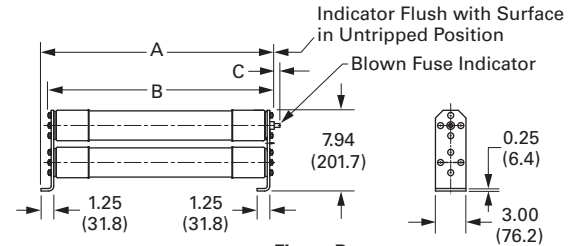
Ampere Rating	Number of Barrels	Figure Number	A	B	C	D	Interrupting Rating rms (kA Sym.)
<b>5.5 kV Maximum—Bolt-in Style—23.73-Inch (602.7 mm) Hole Centers—3.00-Inch (76.2 mm) Barrel Diameter</b>							
750E, 900E	3	C	25.11 (637.8)	22.37 (568.2)	23.73 (602.7)	①	63

**Type HCL Fuse Dimensional Details**

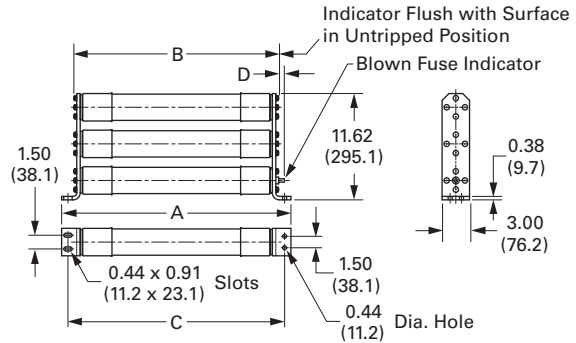
**Type HCL-14 Fuses**



**Figure A**

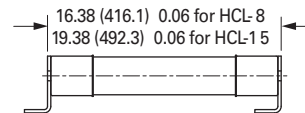


**Figure B**



**Figure C**

**Type HCL Fuses**



**Note**

① 0.5 (12.7) tripped force 2 lb (0.9 kg).

# 3.5

## Power Breakers, Contactors and Fuses

### Current Limiting Fuses

#### Type CLS

#### Type CLS Current Limiting Fuses

3

Maximum Design Voltage (kV)	Current Rating (Amperes)	"R" Designation	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves		Peak Let-Through Current	Catalog Number
									Minimum Melting Time	Total Clearing Time		
2.54	25	—	1	50	3.00 (76.2)	7.00 (177.8)	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2CLS-25</b>
	70	2R	1	50	3.00 (76.2)	7.00 (177.8)	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2CLS-2R</b>
	100	3R	1	50	3.00 (76.2)	7.00 (177.8)	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2CLS-3R</b>
	130	4R	1	50	3.00 (76.2)	7.00 (177.8)	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2CLS-4R</b>
	150	5R	1	50	3.00 (76.2)	7.00 (177.8)	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2CLS-5R</b>
	170	6R	1	50	3.00 (76.2)	7.00 (177.8)	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2CLS-6R</b>
	200	9R	1	50	3.00 (76.2)	7.00 (177.8)	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2CLS-9R</b>
	230	12R	1	50	3.00 (76.2)	7.00 (177.8)	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2CLS-12R</b>
	390	18R	2	50	3.00 (76.2)	7.00 (177.8)	10.80 (274.3)	16 (7.26)	66664702	66664704	66700202	<b>2CLS-18R</b>
	450	24R	2	50	3.00 (76.2)	7.00 (177.8)	10.80 (274.3)	16 (7.26)	66664702	66664704	66700202	<b>2CLS-24R</b>
	25	—	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2ACLS-25</b>
	70	2R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2ACLS-2R</b>
	100	3R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2ACLS-3R</b>
	130	4R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2ACLS-4R</b>
	150	5R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2ACLS-5R</b>
	170	6R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2ACLS-6R</b>
	200	9R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2ACLS-9R</b>
	230	12R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2ACLS-12R</b>
	390	18R	2	50	3.00 (76.2)	Not applicable	10.80 (274.3)	16 (7.26)	66664702	66664704	66700202	<b>2ACLS-18R</b>
	450	24R	2	50	3.00 (76.2)	Not applicable	10.80 (274.3)	16 (7.26)	66664702	66664704	66700202	<b>2ACLS-24R</b>
	25	—	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	8 (3.63)	66664702	66664704	66700202	<b>2BCLS-25</b>
	70	2R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	8 (3.63)	66664702	66664704	66700202	<b>2BCLS-2R</b>
	100	3R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	8 (3.63)	66664702	66664704	66700202	<b>2BCLS-3R</b>
	130	4R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	8 (3.63)	66664702	66664704	66700202	<b>2BCLS-4R</b>
	150	5R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	8 (3.63)	66664702	66664704	66700202	<b>2BCLS-5R</b>
	170	6R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	8 (3.63)	66664702	66664704	66700202	<b>2BCLS-6R</b>
	200	9R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	8 (3.63)	66664702	66664704	66700202	<b>2BCLS-9R</b>
	230	12R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	8 (3.63)	66664702	66664704	66700202	<b>2BCLS-12R</b>
	390	18R	2	50	3.00 (76.2)	Not applicable	10.80 (274.3)	17 (7.72)	66664702	66664704	66700202	<b>2BCLS-18R</b>
	450	24R	2	50	3.00 (76.2)	Not applicable	10.80 (274.3)	17 (7.72)	66664702	66664704	66700202	<b>2BCLS-24R</b>
	25	—	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2HCLS-25</b>
	70	2R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2HCLS-2R</b>
	100	3R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2HCLS-3R</b>
	130	4R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2HCLS-4R</b>
	150	5R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2HCLS-5R</b>
	170	6R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2HCLS-6R</b>
	200	9R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2HCLS-9R</b>
	230	12R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2HCLS-12R</b>
	390	18R	2	50	3.00 (76.2)	Not applicable	10.80 (274.3)	16 (7.26)	66664702	66664704	66700202	<b>2HCLS-18R</b>
	450	24R	2	50	3.00 (76.2)	Not applicable	10.80 (274.3)	16 (7.26)	66664702	66664704	66700202	<b>2HCLS-24R</b>

**Note**

Approximate Dimensions in Inches (mm).

Type CLS Current Limiting Fuses, continued

Maximum Design Voltage (kV)	Current Rating (Amperes)	"R" Designation	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Catalog Number
									Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
5.08	30	—	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5CLS-30</b>
	70	2R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5CLS-2R</b>
	100	3R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5CLS-3R</b>
	130	4R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5CLS-4R</b>
	150	5R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5CLS-5R</b>
	170	6R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5CLS-6R</b>
	200	9R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5CLS-9R</b>
	230	12R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5CLS-12R</b>
	390	18R	2	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	17 (7.72)	66690602	66690702	66700203	<b>5CLS-18R</b>
	450	24R	2	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	17 (7.72)	66690602	66690702	66700203	<b>5CLS-24R</b>
5.08	30	—	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5ACLS-30</b>
	70	2R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5ACLS-2R</b>
	100	3R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5ACLS-3R</b>
	130	4R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5ACLS-4R</b>
	150	5R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5ACLS-5R</b>
	170	6R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5ACLS-6R</b>
	200	9R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5ACLS-9R</b>
	230	12R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5ACLS-12R</b>
	390	18R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	66690602	66690702	66700203	<b>5ACLS-18R</b>
	450	24R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	66690602	66690702	66700203	<b>5ACLS-24R</b>
4.3	480	26R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	66690602	66690702	66700203	<b>4ACLS-26R</b>
5.08	30	—	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5BCLS-30</b>
	70	2R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5BCLS-2R</b>
	100	3R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5BCLS-3R</b>
	130	4R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5BCLS-4R</b>
	150	5R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5BCLS-5R</b>
	170	6R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5BCLS-6R</b>
	200	9R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5BCLS-9R</b>
	230	12R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5BCLS-12R</b>
	390	18R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	66690602	66690702	66700203	<b>5BCLS-18R</b>
	450	24R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	66690602	66690702	66700203	<b>5BCLS-24R</b>
4.3	480	26R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	66690602	66690702	66700203	<b>4BCLS-26R</b>
5.08	30	—	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5HCLS-30</b>
	70	2R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5HCLS-2R</b>
	100	3R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5HCLS-3R</b>
	130	4R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5HCLS-4R</b>
	150	5R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5HCLS-5R</b>
	170	6R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5HCLS-6R</b>
	200	9R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5HCLS-9R</b>
	230	12R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5HCLS-12R</b>
	390	18R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	66690602	66690702	66700203	<b>5HCLS-18R</b>
	450	24R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	66690602	66690702	66700203	<b>5HCLS-24R</b>

**Note**  
Approximate Dimensions in Inches (mm).

# 3.5

## Power Breakers, Contactors and Fuses

### Current Limiting Fuses

#### Type CLS Current Limiting Fuses, continued

Maximum Design Voltage (kV)	Current Rating (Amperes)	"R" Designation	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Catalog Number
									Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
5.08	70	2R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	20 (9.08)	66690602	66690702	66700203	<b>5CLS70-2R</b>
	100	3R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	20 (9.08)	66690602	66690702	66700203	<b>5CLS70-3R</b>
	130	4R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	20 (9.08)	66690602	66690702	66700203	<b>5CLS70-4R</b>
	150	5R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	20 (9.08)	66690602	66690702	66700203	<b>5CLS70-5R</b>
	170	6R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	20 (9.08)	66690602	66690702	66700203	<b>5CLS70-6R</b>
	200	9R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	20 (9.08)	66690602	66690702	66700203	<b>5CLS70-9R</b>
	230	12R	2	50	4.00 (101.6)	Not applicable	15.90 (403.9)	40 (18.16)	66690602	66690702	66700203	<b>5CLS70-12R</b>
	390	18R	2	50	4.00 (101.6)	Not applicable	15.90 (403.9)	40 (18.16)	66690602	66690702	66700203	<b>5CLS70-18R</b>
	450	24R	2	50	4.00 (101.6)	Not applicable	15.90 (403.9)	40 (18.16)	66690602	66690702	66700203	<b>5CLS70-24R</b>
	600	32R	2	50	4.00 (101.6)	Not applicable	15.90 (403.9)	40 (18.16)	66690602	66690702	66700203	<b>5CLS70-32R</b>
	650	36R	2	50	4.00 (101.6)	Not applicable	15.90 (403.9)	40 (18.16)	66690602	66690702	66700203	<b>5CLS70-36R</b>
	700	44R	2	50	4.00 (101.6)	Not applicable	15.90 (403.9)	40 (18.16)	66690602	66690702	66700203	<b>5CLS70-44R</b>
5.5	70	2R	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	51285302	51285402	66700204	<b>5LCLS-2R</b>
	100	3R	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	51285302	51285402	66700204	<b>5LCLS-3R</b>
	130	4R	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	51285302	51285402	66700204	<b>5LCLS-4R</b>
	150	5R	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	51285302	51285402	66700204	<b>5LCLS-5R</b>
	170	6R	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	51285302	51285402	66700204	<b>5LCLS-6R</b>
	200	9R	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	51285302	51285402	66700204	<b>5LCLS-9R</b>
	230	12R	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	51285302	51285402	66700204	<b>5LCLS-12R</b>
	390	18R	2	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	22 (9.99)	51285302	51285402	66700204	<b>5LCLS-18R</b>
	450	24R	2	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	22 (9.99)	51285302	51285402	66700204	<b>5LCLS-24R</b>
8.3	70	2R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	7 (3.18)	66700602	66700702	66700205	<b>8CLS-2R</b>
	100	3R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	7 (3.18)	66700602	66700702	66700205	<b>8CLS-3R</b>
	130	4R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	7 (3.18)	66700602	66700702	66700205	<b>8CLS-4R</b>
	150	5R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	7 (3.18)	66700602	66700702	66700205	<b>8CLS-5R</b>
	170	6R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	7 (3.18)	66700602	66700702	66700205	<b>8CLS-6R</b>
7.2	200	9R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	7 (3.18)	66700602	66700702	66700205	<b>7CLS-9R</b>
	230	12R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	7 (3.18)	66700602	66700702	66700205	<b>7CLS-12R</b>
	390	18R	2	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	16 (7.26)	66700602	66700702	66700205	<b>7CLS-18R</b>
	450	24R	2	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	16 (7.26)	66700602	66700702	66700205	<b>7CLS-24R</b>
8.3	70	2R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	7 (3.18)	66700602	66700702	66740205	<b>7BCLS-2R</b>
	100	3R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	7 (3.18)	66700602	66700702	66740205	<b>7BCLS-3R</b>
	130	4R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	7 (3.18)	66700602	66700702	66740205	<b>7BCLS-4R</b>
	150	5R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	7 (3.18)	66700602	66700702	66740205	<b>7BCLS-5R</b>
	170	6R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	7 (3.18)	66700602	66700702	66740205	<b>7BCLS-6R</b>
7.2	200	9R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	7 (3.18)	66700602	66700702	66740205	<b>7BCLS-9R</b>
	230	12R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	7 (3.18)	66700602	66700702	66740205	<b>7BCLS-12R</b>
	390	18R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	16 (7.26)	66700602	66700702	66740205	<b>7BCLS-18R</b>
	450	24R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	16 (7.26)	66700602	66700702	66740205	<b>7BCLS-24R</b>
8.3	70	2R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66700602	66700702	66740205	<b>8ACLS-2R</b>
	100	3R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66700602	66700702	66740205	<b>8ACLS-3R</b>
	130	4R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66700602	66700702	66740205	<b>8ACLS-4R</b>
	150	5R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66700602	66700702	66740205	<b>8ACLS-5R</b>
	170	6R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66700602	66700702	66740205	<b>8ACLS-6R</b>

**Note**

Approximate Dimensions in Inches (mm).

Type CLS Current Limiting Fuses, continued

Maximum Design Voltage (kV)	Current Rating (Amperes)	"R" Designation	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves		Peak Let-Through Current	Catalog Number
									Minimum Melting Time	Total Clearing Time		
7.2	200	9R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66700602	66700702	66740205	<b>7ACLS-9R</b>
	230	12R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66700602	66700702	66740205	<b>7ACLS-12R</b>
	390	18R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	66700602	66700702	66740205	<b>7ACLS-18R</b>
	450	24R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	66700602	66700702	66740205	<b>7ACLS-24R</b>
	450	24R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	20 (9.08)	66700602	66700702	66740205	<b>7CLS70-24R</b>
	650	36R	3	50	3.00 (76.2)	Not applicable	15.90 (403.9)	30 (13.62)	66700602	66700702	66740205	<b>7CLS70-36R</b>
	700	44R	2	50	4.00 (101.6)	Not applicable	15.90 (403.9)	40 (18.16)	66700602	66700702	66740205	<b>7CLS70-44R</b>
8.3	15	Not applicable	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	66664202	66664302	66679802	<b>8CLS-15</b>
	30	Not applicable	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	66664202	66664302	66679802	<b>8CLS-30</b>
	60	Not applicable	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	66664202	66664302	66679802	<b>8CLS-60</b>
	70	Not applicable	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	66664202	66664302	66679802	<b>8CLS-70</b>
	90	Not applicable	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	66664202	66664302	66679802	<b>8CLS-90</b>
	110	Not applicable	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	66664202	66664302	66679802	<b>8CLS-110</b>
	125	Not applicable	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	66664202	66664302	66679802	<b>8CLS-125</b>
	150	Not applicable	2	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	22 (9.99)	66664202	66664302	66679802	<b>8CLS-150</b>
	200	Not applicable	2	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	22 (9.99)	66664202	66664302	66679802	<b>8CLS-200</b>
	225	Not applicable	2	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	22 (9.99)	66664202	66664302	66679802	<b>8CLS-225</b>

**Note**  
Approximate Dimensions in Inches (mm).



# 3.5

## Power Breakers, Contactors and Fuses

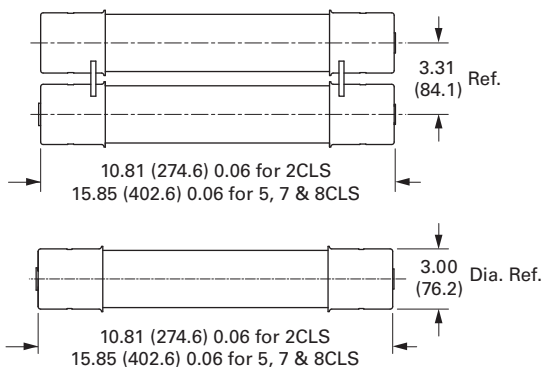
### Current Limiting Fuses

#### Fuse Dimensional Details

Approximate Dimensions in Inches (mm)

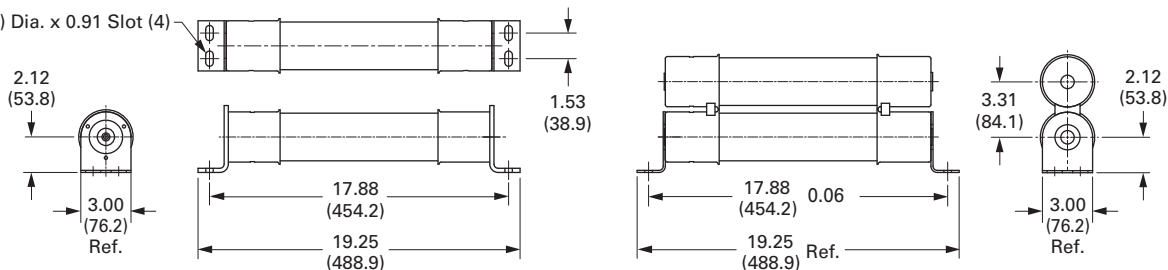
#### Type CLS Fuse

3



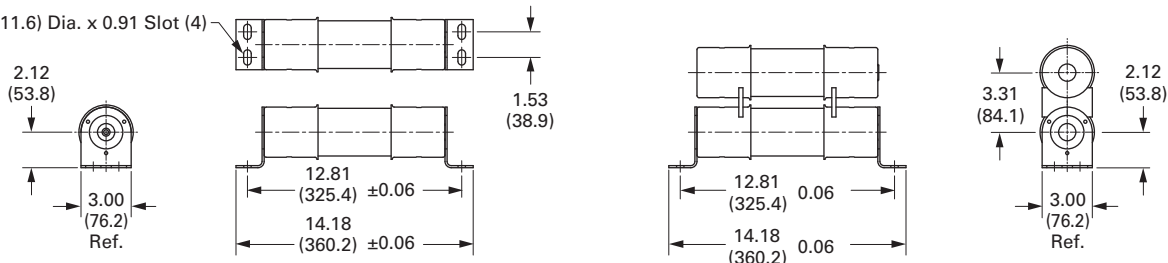
#### Type BCLS Fuse

0.455 (11.6) Dia. x 0.91 Slot (4)



Type 5BCLS and 7BCLS Fuses

0.455 (11.6) Dia. x 0.91 Slot (4)



Type 2BCLS Fuse

Type CLS Mountings and Hardware

Maximum Design Voltage (kV)	Ampere Rating	Fuse Mounting Type	Voltage BIL (kV)	Mounting (Including Live Parts, End Fittings) ①		Live Parts (Including End Fittings)	End Fittings (Disconnect Only) ①
				Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number	Catalog Number	Catalog Number
2.54	25–230	Non-disconnect	60	2CLE-PNM-D	2CLE-GNM-D	CLE-NL-D	—
		Disconnect	60	2CLE-PDM-D	2CLE-GDM-E	CLE-DL-D	CLE-DF-D
	390–450	Non-disconnect	60	2CLE-PNM-E	2CLE-GNM-E	CLE-NL-E	—
		Disconnect	60	2CLE-PDM-E	2CLE-GDM-E	CLE-DL-E	CLE-DF-E
5.5 (CLS)	30–230	Non-disconnect	60	5HLE-PNM-D	5HLE-GNM-D	CLE-NL-D	—
		Disconnect	60	5HLE-PDM-D	5HLE-GDM-E	CLE-DL-D	CLE-DF-D
	390–480	Non-disconnect	60	5HLE-PNM-E	5HLE-GNM-E	CLE-NL-E	—
		Disconnect	60	5HLE-PDM-E	5HLE-GDM-E	CLE-DL-E	CLE-DF-E
5.5 (LCLS)	70–230	Non-disconnect	60	5CLE-PNM-D	5CLE-GNM-D	CLE-NL-D	—
		Disconnect	60	5CLE-PDM-D	5CLE-GDM-D	CLE-DL-D	CLE-DF-D
			75	8CLE-PDM-D	8CLE-GDM-D	CLE-DL-D	CLE-DF-D
	390–450	Non-disconnect	60	5CLE-PNM-E	5CLE-GNM-E	CLE-NL-E	—
		Disconnect	60	5CLE-PDM-E	5CLE-GDM-E	CLE-DL-E	CLE-DF-E
			75	8CLE-PDM-E	8CLE-PDM-E	CLE-DL-E	CLE-DF-E
8.3	70–100	Non-disconnect	75	8HLE-PNM-D	8HLE-GNM-D	CLE-NL-D	—
	130–230	Disconnect	75	8HLE-PDM-D	8HLE-GDM-D	CLE-DL-D	CLE-DF-D
7.2	390–450	Non-disconnect	75	8HLE-PDM-E	8HLE-GNM-E	CLE-NL-E	—
		Disconnect	75	8HLE-PDM-E	8HLE-GDM-E	CLE-DL-E	CLE-DF-E
8.3	15–30	Non-disconnect	75	8CLE-PNM-D	8CLE-GNM-D	CLE-NL-D	—
	60–125	Disconnect	75	8CLE-PDM-D	8CLE-GDM-D	CLE-DL-D	CLS-DF-D
			75	8CLE-PNM-E	8CLE-GNM-E	CLE-NL-E	—
	150–225	Disconnect	75	8CLE-PDM-E	8CLE-GDM-E	CLE-DL-E	CLE-DF-E

Note

① Disconnect only.

# 3.5

## Power Breakers, Contactors and Fuses

### Current Limiting Fuses

#### Type CLPT

Indicating

3





#### Type CLPT Current Limiting Fuses 2.475 kV Maximum (2.4 kV Nominal)

Current Rating (Amperes)	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves		Peak Let-Through Current	Catalog Number
						Minimum Melting Time	Total Clearing Time		
0.25E	63	0.81 (20.6)	—	4.50 (114.3)	0.25 (0.11)	56357202	59883702	63933702	<b>2NCLPT-.25E</b>
0.5E	63	0.81 (20.6)	—	4.50 (114.3)	0.25 (0.11)	56357202	59883702	63933702	<b>2NCLPT-.5E</b>
1E	40	0.81 (20.6)	—	4.50 (114.3)	0.25 (0.11)	56357202	59883702	63933702	<b>2NCLPT-1E</b>
2E	40	0.81 (20.6)	—	4.50 (114.3)	0.25 (0.11)	56357202	59883702	63933702	<b>2NCLPT-2E</b>
5E	25	0.81 (20.6)	—	4.50 (114.3)	0.25 (0.11)	56357202	59883702	63933702	<b>2NCLPT-5E</b>

**Note**

Approximate Dimensions in Inches (mm).

Type CLPT Current Limiting Fuses 5.5 kV Maximum (4.8 kV Nominal)

	Current Rating (Amperes)	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves		Peak Let-Through Current	Catalog Number
							Minimum Melting Time	Total Clearing Time		
<b>Non-Indicating</b>										
	<b>Non-Indicating</b>									
	0.5E	63	0.81 (20.6)	—	5.63 (143.0)	0.25 (0.11)	66702402	66702502	66704101	5NCLPT-.5E
	1E	63	0.81 (20.6)	—	5.63 (143.0)	0.25 (0.11)	66702402	66702502	66704101	5NCLPT-1E
	2E	63	0.81 (20.6)	—	5.63 (143.0)	0.25 (0.11)	66702402	66702502	66704101	5NCLPT-2E
	3E	63	0.81 (20.6)	—	5.63 (143.0)	0.25 (0.11)	66702402	66702502	66704101	5NCLPT-3E
	4E	63	0.81 (20.6)	—	5.63 (143.0)	0.25 (0.11)	66702402	66702502	66704101	5NCLPT-4E
	5E	63	0.81 (20.6)	—	5.63 (143.0)	0.25 (0.11)	66702402	66702502	66704101	5NCLPT-5E
	0.5E	50	1.00 (25.4)	—	5.63 (143.0)	0.25 (0.11)	66702402	66702502	66704101	317B487H02
	1E	50	1.00 (25.4)	—	5.63 (143.0)	0.25 (0.11)	66702402	66702502	66704101	317B487H06
	2E	50	1.00 (25.4)	—	5.63 (143.0)	0.25 (0.11)	66702402	66702502	66704101	317B487H03
	3E	50	1.00 (25.4)	—	5.63 (143.0)	0.25 (0.11)	66702402	66702502	66704101	317B487H04
	5E	50	1.00 (25.4)	—	5.63 (143.0)	0.25 (0.11)	66702402	66702502	66704101	317B487H05
	0.5E	63	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	70548302	70548402	63934002	5NCLPT-.5E-A
	1E	63	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	70548302	70548402	63934002	5NCLPT-1E-A
2E	63	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	70548302	70548402	63934002	5NCLPT-2E-A	
3E	63	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	70548302	70548402	63934002	5NCLPT-3E-A	
5E	63	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	70548302	70548402	63934002	5NCLPT-5E-A	
10E	63	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	70548302	70548402	63934002	5NCLPT-10E-A	
<b>Indicating</b>										
	<b>Indicating</b>									
	0.5E	80	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	56353206	56353306	63934001	5CLPT-.5E
	1E	80	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	56353206	56353306	63934001	5CLPT-1E
	1.5E	80	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	56353206	56353306	63934001	5CLPT-1.5E
	3E	80	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	56353206	56353306	63934001	5CLPT-3E
	5E	80	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	56353206	56353306	63934001	5CLPT-5E
	10E	80	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	56353206	56353306	63934001	5CLPT-10E

Type CLPT Mountings and Hardware 5.5 kV Maximum (4.8 kV Nominal) ③

Ampere Rating	Fuse Mounting Type ①	Voltage BIL (kV)	Mounting (Including Live Parts, End Fittings) ②		Live Parts (Including End Fittings) ②	End Fittings (Disconnect Only)
			Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number		
0.5–2	Non-disconnect	60	5CLPT-PNM-A	5CLPT-GNM-A	CLPT-NL	—
	Disconnect	60	5CLPT-PDM-A	5CLPT-GDM-A	CLPT-DL	CLPT-DF
3–10	Non-disconnect	60	5CLPT-PNM-B	5CLPT-GNM-B	CLPT-NL	—
	Disconnect	60	5CLPT-PDM-B	5CLPT-GDM-B	CLPT-DL	CLPT-DF

Notes

① See Page V4-T3-127 for diagram of typical mounting.

② End fittings supplied only when required.

③ Refers only to 5CLPT and 5NCLPT-A fuses only.

Approximate Dimensions in Inches (mm).

#### Type CLPT Current Limiting Fuses 8.3 kV Maximum (7.2 kV Nominal)

Current Rating (Amperes)	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves		Peak Let-Through Current	Catalog Number
						Minimum Melting Time	Total Clearing Time		
<b>Non-Indicating</b>									
2E	25	0.81 (20.6)	—	8.00 (203.2)	0.25 (0.11)	56357206	59883706	63933704	<b>8NCLPT-2E</b>
4E	25	0.81 (20.6)	—	8.00 (203.2)	0.25 (0.11)	56357206	59883706	63933704	<b>8NCLPT-4E</b>
10E	50	1.10 (27.9)	—	5.00 (127.0)	0.5 (0.23)	56357206	59883706	63933704	<b>8NCLPT-0E</b>
1E	50	1.10 (27.9)	—	5.00 (127.0)	0.5 (0.23)	56357206	59883706	63933704	<b>8NCLPT-1E</b>
5E	50	1.10 (27.9)	—	5.00 (127.0)	0.5 (0.23)	56357206	59883706	63933704	<b>8NCLPT-5E</b>
0.5E	50	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.5 (0.70)	70548303	70548403	63934002	<b>8NCLPT-.5E-A</b>
1E	50	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.5 (0.70)	70548303	70548403	63934002	<b>8NCLPT-1E-A</b>
2E	50	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.5 (0.70)	70548303	70548403	63934002	<b>8NCLPT-2E-A</b>
3E	50	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.5 (0.70)	70548303	70548403	63934002	<b>8NCLPT-3E-B</b>
5E	50	1.60 (40.6)	11.50 (292.1)	12.90 (327.7)	1.6 (0.73)	70548303	70548403	63934002	<b>8NCLPT-5E-B</b>
10E	50	1.60 (40.6)	11.50 (292.1)	12.90 (327.7)	1.6 (0.73)	70548303	70548403	63934002	<b>8NCLPT-10E-B</b>
<b>Indicating</b>									
.5E	80	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.5 (0.70)	56353206	56353306	63934001	<b>8CLPT-.5E</b>
3E	80	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.6 (0.73)	56353206	56353306	63934001	<b>8CLPT-3E</b>
5E	50	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.6 (0.73)	56353206	56353306	63934001	<b>8CLPT-5E</b>
10E	50	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.6 (0.73)	56353206	56353306	63934001	<b>8CLPT-10E</b>



#### Type CLPT Mountings and Hardware 8.3 kV Maximum (7.2 kV Nominal) <sup>③</sup>



Ampere Rating	Fuse Mounting Type <sup>①</sup>	Voltage BIL (kV)	Mounting (Including Live Parts, End Fittings) <sup>②</sup>		Live Parts (Including End Fittings) <sup>②</sup>	End Fittings (Disconnect Only)
			Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number		
0.5–2	Non-disconnect	75	<b>8CLPT-PNM-A</b>	<b>8CLPT-GNM-A</b>	<b>CLPT-NL</b>	—
	Disconnect	75	<b>8CLPT-PDM-A</b>	<b>8CLPT-GDM-A</b>	<b>CLPT-DL</b>	<b>CLPT-DF</b>
3–10	Non-disconnect	75	<b>8CLPT-PNM-B</b>	<b>8CLPT-GNM-B</b>	<b>CLPT-NL</b>	—
	Disconnect	75	<b>8CLPT-PDM-B</b>	<b>8CLPT-GDM-B</b>	<b>CLPT-DL</b>	<b>CLPT-DF</b>

#### Notes

- ① See **Page V4-T3-127** for diagram of typical mounting.
- ② End fittings supplied only when required.
- ③ Refers only to 8CLPT and 8NCLPT-A or -B fuses only.

Approximate Dimensions in Inches (mm).

**Type CLPT Current Limiting Fuses 15.5 kV Maximum (7.2 kV Nominal)**

	Current Rating (Amperes)	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves		Peak Let-Through Current	Catalog Number
							Minimum Melting Time	Total Clearing Time		
<b>Non-Indicating</b>										
	0.5E	63	1.60 (40.6)	11.50 (292.1)	12.90 (327.7)	1.6 (0.73)	70548303	70548403	63934002	<b>15NCLPT-.5E</b>
	1E	63	1.60 (40.6)	11.50 (292.1)	12.90 (327.7)	1.6 (0.73)	70548303	70548403	63934002	<b>15NCLPT-1E</b>
	2E	63	1.60 (40.6)	11.50 (292.1)	12.90 (327.7)	1.6 (0.73)	70548303	70548403	63934002	<b>15NCLPT-1.5E</b>
	3E	63	1.60 (40.6)	16.10 (408.9)	17.60 (447.0)	2 (0.91)	70548303	70548403	63934002	<b>15NCLPT-3E</b>
	5E	63	1.60 (40.6)	16.10 (408.9)	17.60 (447.0)	2 (0.91)	70548303	70548403	63934002	<b>15NCLPT-5E</b>
	10E	63	1.60 (40.6)	16.10 (408.9)	17.60 (447.0)	2 (0.91)	70548303	70548403	63934002	<b>15NCLPT-10E</b>
<b>Indicating</b>										
	0.5E	80	1.60 (40.6)	11.50 (292.1)	12.90 (327.7)	1.6 (0.73)	56353206	56353306	63934001	<b>15CLPT-.5E</b>
	1E	80	1.60 (40.6)	11.50 (292.1)	12.90 (327.7)	1.6 (0.73)	56353206	56353306	63934001	<b>15CLPT-1E</b>
	2E	80	1.60 (40.6)	11.50 (292.1)	12.90 (327.7)	1.6 (0.73)	56353206	56353306	63934001	<b>15CLPT-1.5E</b>
	3E	80	1.60 (40.6)	16.10 (408.9)	17.60 (447.0)	2 (0.91)	56353206	56353306	63934001	<b>15CLPT-3E</b>
	5E	80	1.60 (40.6)	16.10 (408.9)	17.60 (447.0)	2 (0.91)	56353206	56353306	63934001	<b>15CLPT-5E</b>
	10E	50	1.60 (40.6)	16.10 (408.9)	17.60 (447.0)	2 (0.91)	56353206	56353306	63934001	<b>15CLPT-10E</b>

**Type CLPT Mountings and Hardware 15.5 kV Maximum (14.4 kV Nominal)**

Ampere Rating	Fuse Mounting Type ①	Voltage BIL (kV)	Mounting (Including Live Parts, End Fittings) ②		Live Parts (Including End Fittings) ②	End Fittings (Disconnect Only)
			Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number	Catalog Number	Catalog Number
0.5–2	Non-disconnect	95	<b>15CLPT-PNM-A</b>	<b>15CLPT-GNM-A</b>	<b>CLPT-NL</b>	—
	Disconnect	95	<b>15CLPT-PDM-A</b>	<b>15CLPT-GDM-A</b>	<b>CLPT-DL</b>	<b>CLPT-DF</b>
3–10	Non-disconnect	95	<b>15CLPT-PNM-B</b>	<b>15CLPT-GNM-B</b>	<b>CLPT-NL</b>	<b>CLPT-DF</b>
	Disconnect	95	<b>15CLPT-PDM-B</b>	<b>15CLPT-GDM-B</b>	<b>CLPT-DL</b>	—

**Notes**

① See **Page V4-T3-127** for diagram of typical mounting.

② End fittings supplied only when required.

Approximate Dimensions in Inches (mm).

# 3.5

## Power Breakers, Contactors and Fuses

### Current Limiting Fuses

3

#### Type CLPT Current Limiting Fuses 25.5 kV Maximum (23.0 kV Nominal)

Current Rating (Amperes)	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Catalog Number
						Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
0.5E	44	1.60 (40.6)	16.10 (408.9)	17.60 (447.0)	2 (0.91)	56353208	56353308	63933901	25CLPT-.5E
1E	44	1.60 (40.6)	16.10 (408.9)	17.60 (447.0)	2 (0.91)	56353208	56353308	63933901	25CLPT-1E

#### Type CLPT Mountings and Hardware 25.5 kV Maximum (23.0 kV Nominal)

Ampere Rating	Fuse Mounting Type <sup>①</sup>	Voltage BIL (kV)	Mounting (Including Live Parts, End Fittings) <sup>②</sup>		Live Parts (Including End Fittings) <sup>②</sup>	End Fittings (Disconnect Only)
			Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number		
0.5E-1E	Non-disconnect	150	25CLPT-PNM-A	—	25CLPT-NL	—
	Disconnect	150	25CLPT-PDM-A	—	25CLPT-DL	CLPT-DF

#### Type CLPT Current Limiting Fuses 38.0 kV Maximum (34.5 kV Nominal)

Current Rating (Amperes)	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Catalog Number
						Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
0.5E	44	1.60 (40.6)	17.10 (434.3)	18.60 (472.4)	2 (0.91)	56353208	56353308	63933901	38CLPT-.5E

#### Type CLPT Mountings and Hardware 38.0 kV Maximum (34.5 kV Nominal)

Ampere Rating	Fuse Mounting Type <sup>①</sup>	Voltage BIL (kV)	Mounting (Including Live Parts, End Fittings) <sup>②</sup>		Live Parts (Including End Fittings) <sup>②</sup>	End Fittings (Disconnect Only)
			Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number		
0.5E	Disconnect	—	Not applicable	Not applicable	25CLPT-NL	CLPT-DF
	Non-disconnect	—	Not applicable	Not applicable	25CLPT-DL	—

#### Notes

① See Page V4-T3-127 for diagram of typical mounting.

② End fittings supplied only when required.

Approximate Dimensions in Inches (mm).

Type CX

Type CX



Type CX Current Limiting Fuses 4.3 kV Maximum (2.4 kV Nominal)

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Fuse Mounting Code	Diameter	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves				Catalog Number
							Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	$I^2t$	
<b>Non-Indicating</b>											
18C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544101	TC70544501	TC70544901	TC70545101	<b>4CX-18C</b>
25C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544101	TC70544501	TC70544901	TC70545101	<b>4CX-25C</b>
35C	1	50	G	2.00 (50.8)	10.00 (254.0)	1 (0.45)	TC70544101	TC70544501	TC70544901	TC70545101	<b>4CX-35C</b>
45C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544101	TC70544501	TC70544901	TC70545101	<b>4CX-45C</b>
50C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544101	TC70544501	TC70544901	TC70545101	<b>4CX-50C</b>
60C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544102	TC70544502	TC70544901	TC70545101	<b>4CX-60C</b>
65C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544102	TC70544501	TC70544901	TC70545101	<b>4CX-65C</b>
75C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544102	TC70544501	TC70544901	TC70545101	<b>4CX-75C</b>
80C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544102	TC70544502	TC70544901	TC70545101	<b>4CX-80C</b>
100C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544102	TC70544501	TC70544901	TC70545101	<b>4CX-100C</b>
<b>Indicating</b>											
18C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544101	TC70544501	TC70544901	TC70545101	<b>4CXI-18C</b>
25C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544101	TC70544501	TC70544901	TC70545101	<b>4CXI-25C</b>
35C	1	50	G	2.00 (50.8)	10.00 (254.0)	1 (0.45)	TC70544101	TC70544501	TC70544901	TC70545101	<b>4CXI-35C</b>
45C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544101	TC70544501	TC70544901	TC70545101	<b>4CXI-45C</b>
50C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544101	TC70544501	TC70544901	TC70545101	<b>4CXI-50C</b>
60C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544102	TC70544502	TC70544901	TC70545101	<b>4CXI-60C</b>
65C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544102	TC70544501	TC70544901	TC70545101	<b>4CXI-65C</b>
75C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544102	TC70544501	TC70544901	TC70545101	<b>4CXI-75C</b>
80C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544102	TC70544502	TC70544901	TC70545101	<b>4CXI-80C</b>
100C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544102	TC70544501	TC70544901	TC70545101	<b>4CXI-100C</b>

Type CX Mountings and Hardware 4.3 kV Maximum (2.4 kV Nominal)

Ampere Rating	Fuse Mounting Type <sup>①</sup>	Size	Voltage BIL (kV)	Mounting (Including Live Parts, End Fittings) <sup>②</sup>		Live Parts (Including End Fittings) <sup>②</sup>	End Fittings (Disconnect Only)
				Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number		
18C-100C	Non-disconnect	A	60	—	<b>5CX-GNM-G</b>	<b>CX-NL</b>	—
	Disconnect	A	60	—	<b>5CX-GDM-G</b>	<b>CX-DL</b>	<b>CX-DF</b>

Notes

① See Page V4-T3-127 for diagram of typical mounting.

② End fittings supplied only when required.

Approximate Dimensions in Inches (mm).



Type CX



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#### Type CX Current Limiting Fuses 5.5 kV Maximum (4.8 kV Nominal)

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Fuse Mounting Code	Diameter	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Peak Let-Through Current	I <sup>2</sup> t	Catalog Number
							Minimum Melting Time	Total Clearing Time				
<b>Non-Indicating</b>												
10C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CX-10C</b>	
12C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CX-12C</b>	
18C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CX-18C</b>	
20C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CX-20C</b>	
21C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544202	TC70544602	TC70544902	TC70545201	<b>5CX-21C</b>	
25C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CX-25C</b>	
30C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CX-30C</b>	
35C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544202	TC70544602	TC70544902	TC70545201	<b>5CX-35C</b>	
40C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CX-40C</b>	
50C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CX-50C</b>	
60C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544202	TC70544602	TC70544902	TC70545201	<b>5CX-60C</b>	
65C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CX-65C</b>	
75C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CX-75C</b>	
<b>Indicating</b>												
10C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CXI-10C</b>	
12C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CXI-12C</b>	
18C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CXI-18C</b>	
20C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CXI-20C</b>	
21C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544202	TC70544602	TC70544902	TC70545201	<b>5CXI-21C</b>	
25C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CXI-25C</b>	
30C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CXI-30C</b>	
35C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544202	TC70544602	TC70544902	TC70545201	<b>5CXI-35C</b>	
40C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CXI-40C</b>	
50C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CXI-50C</b>	
60C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544202	TC70544602	TC70544902	TC70545201	<b>5CXI-60C</b>	
65C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CXI-65C</b>	
75C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CXI-75C</b>	

#### Type CX Mountings and Hardware 5.5 kV Maximum (4.8 kV Nominal)

Ampere Rating	Fuse Mounting Type <sup>①</sup>	Size	Voltage BIL (kV)	Mounting (Including Live Parts, End Fittings) <sup>②</sup>		Live Parts (Including End Fittings) <sup>②</sup>	End Fittings (Disconnect Only)
				Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number		
10C-75C	Non-disconnect	A	60	—	<b>5CX-GNM-G</b>	<b>CX-NL</b>	—
	Disconnect	A	60	—	<b>5CX-GDM-G</b>	<b>CX-DL</b>	<b>CX-DF</b>

**Notes**

① See Page V4-T3-127 for diagram of typical mounting.

② End fittings supplied only when required.

Approximate Dimensions in Inches (mm).

Type CX



Type CX Current Limiting Fuses 8.3 kV Maximum (7.2 kV Nominal)

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Fuse Mounting Code	Diameter	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Peak Let-Through Current	I <sup>2</sup> t	Catalog Number
							Minimum Melting Time	Total Clearing Time				
<b>Non-Indicating</b>												
3.5C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544302	TC70544702	TC70545001	TC70545301	<b>8CX-3.5C</b>	
4C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544302	TC70544702	TC70545001	TC70545301	<b>8CX-4C</b>	
4.5C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CX-4.5C</b>	
6C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CX-6C</b>	
7C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544302	TC70544702	TC70545001	TC70545301	<b>8CX-7C</b>	
8C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CX-8C</b>	
10C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CX-10C</b>	
12C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CX-12C</b>	
15C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544302	TC70544702	TC70545001	TC70545301	<b>8CX-15C</b>	
18C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CX-18C</b>	
20C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CX-20C</b>	
25C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CX-25C</b>	
30C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CX-30C</b>	
35C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544302	TC70544702	TC70545001	TC70545301	<b>8CX-35C</b>	
40C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CX-40C</b>	
<b>Indicating</b>												
3.5C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544302	TC70544702	TC70545001	TC70545301	<b>8CXI-3.5C</b>	
4C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544302	TC70544702	TC70545001	TC70545301	<b>8CXI-4C</b>	
4.5C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CXI-4.5C</b>	
6C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CXI-6C</b>	
7C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544302	TC70544702	TC70545001	TC70545301	<b>8CXI-7C</b>	
8C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CXI-8C</b>	
10C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CXI-10C</b>	
12C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CXI-12C</b>	
15C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544302	TC70544702	TC70545001	TC70545301	<b>8CXI-15C</b>	
18C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CXI-18C</b>	
20C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CXI-20C</b>	
25C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CXI-25C</b>	
30C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CXI-30C</b>	
35C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544302	TC70544702	TC70545001	TC70545301	<b>8CXI-35C</b>	
40C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CXI-40C</b>	

Type CX Mountings and Hardware 8.3 kV Maximum (7.2 kV Nominal)

Ampere Rating	Fuse Mounting Type ①	Size	Voltage BIL (kV)	Mounting (Including Live Parts, End Fittings) ②		Live Parts (Including End Fittings) ②	End Fittings (Disconnect Only)
				Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number		
3.5C-40C	Non-disconnect	B	75	—	<b>8CX-GNM-G</b>	<b>CX-NL</b>	—
	Disconnect	B	75	—	<b>8CX-GDM-G</b>	<b>CX-DL</b>	<b>CX-DF</b>

Notes

① See Page V4-T3-127 for diagram of typical mounting.

② End fittings supplied only when required.

Approximate Dimensions in Inches (mm).

Type CX



3

#### Type CX Current Limiting Fuses 15.5 kV Maximum (14.4 kV Nominal)

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Fuse Mounting Code	Diameter	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Peak Let-Through Current I <sub>2t</sub>	Catalog Number
							Minimum Melting Time	Total Clearing Time			
<b>Non-Indicating</b>											
4C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CX-4C</b>
6C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CX-6C</b>
7C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544402	TC70544802	TC70545002	TC70545401	<b>15CX-7C</b>
8C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CX-8C</b>
10C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CX-10C</b>
12C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CX-12C</b>
15C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544402	TC70544802	TC70545002	TC70545401	<b>15CX-15C</b>
18C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CX-18C</b>
20C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CX-20C</b>
25C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CX-25C</b>
30C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CX-30C</b>
40C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CX-40C</b>
<b>Indicating</b>											
4C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CXI-4C</b>
6C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CXI-6C</b>
7C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544402	TC70544802	TC70545002	TC70545401	<b>15CXI-7C</b>
8C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CXI-8C</b>
10C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CXI-10C</b>
12C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CXI-12C</b>
15C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544402	TC70544802	TC70545002	TC70545401	<b>15CXI-15C</b>
18C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CXI-18C</b>
20C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CXI-20C</b>
25C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CXI-25C</b>
30C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CXI-30C</b>
40C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CXI-40C</b>

#### Type CX Mountings and Hardware 15.5 kV Maximum (14.4 kV Nominal)

Ampere Rating	Fuse Mounting Type <sup>①</sup>	Size	Voltage BIL (kV)	Mounting (Including Live Parts, End Fittings) <sup>②</sup>		Live Parts (Including End Fittings) <sup>②</sup>	End Fittings (Disconnect Only)
				Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number		
4C–40C	Non-disconnect	C	95	—	<b>15CX-GNM-G</b>	<b>CX-NL</b>	—
	Disconnect	C	95	—	<b>15CX-GDM-G</b>	<b>CX-DL</b>	<b>CX-DF</b>

**Notes**

① See Page V4-T3-127 for diagram of typical mounting.

② End fittings supplied only when required.

Approximate Dimensions in Inches (mm).

Type CXN

Type CXN



Type CXN Current Limiting Fuses 8.3 kV Maximum (7.2 kV Nominal)

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Catalog Number
						Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
60C	1	50	3.00 (76.2)	18.80 (477.5)	8 (3.63)	66675102	66675202	66664902	<b>8CXN-60C</b>
100C	1	50	3.00 (76.2)	18.80 (477.5)	8 (3.63)	66675102	66675202	66664902	<b>8CXN-100C</b>
125C	1	50	4.00 (101.6)	18.80 (477.5)	14 (6.36)	66675102	66675202	66664902	<b>8CXN-125C</b>
150C	1	50	4.00 (101.6)	18.80 (477.5)	14 (6.36)	66675102	66675202	66664902	<b>8CXN-150C</b>
200C	1	50	4.00 (101.6)	18.80 (477.5)	14 (6.36)	66675102	66675202	66664902	<b>8CXN-200C</b>
250C	1	50	4.00 (101.6)	18.80 (477.5)	14 (6.36)	66675102	66675202	66664902	<b>8CXN-250C</b>
120C	2	50	3.00 (76.2)	18.80 (477.5)	16 (7.26)	66675104	66675204	66664902	2 X 60C <b>8CXN-120C</b>
200C	2	50	3.00 (76.2)	18.80 (477.5)	16 (7.26)	66675104	66675204	66664902	2 X 100C <b>8CXN-200C</b>
250C	2	50	3.00 (76.2)	18.80 (477.5)	16 (7.26)	66675104	66675204	66664902	2 X 125C <b>8CXN-250C</b>
300C	2	50	4.00 (101.6)	18.80 (477.5)	28 (12.71)	66675104	66675204	66664902	2 X 150C <b>8CXN-300C</b>

Type CXN Mountings and Hardware 8.3 kV Maximum (7.2 kV Nominal)

Ampere Rating	Fuse Mounting Type ①	Voltage LIWL (BIL)	Glass Polyester Insulator Mounting (Including Live Parts, End Fittings) ②	Live Parts ②	End Fittings (Disconnect Only)
			Catalog Number	Catalog Number	Catalog Number
60C–100C Single barrel	Non-disconnect	95	<b>15CXN-GNM-D</b>	<b>15CXN-NL-D</b>	—
	Non-disconnect	95	<b>15CXN-GNM-G</b>	<b>15CXN-NL-G</b>	—
	Disconnect	95	<b>15CXN-GDM-G</b>	<b>15CXN-DL-G</b>	<b>15CXN-DF-G</b>
125C–250C Single barrel	Non-disconnect	95	<b>15CXN-GNM-F</b>	<b>15CXN-NL-F</b>	—
	Non-disconnect	95	<b>15CXN-GNM-G</b>	<b>15CXN-NL-G</b>	—
	Disconnect	95	<b>25CXN-GDM-G</b>	<b>15CXN-DL-G</b>	<b>15CXN-DF-G</b>
120C, 200C Double barrel	Non-disconnect	95	<b>15CXN-GNM-D</b>	<b>15CXN-NL-D</b>	—
250C, 300C Double barrel	Non-disconnect	95	<b>15CXN-GNM-F</b>	<b>15CXN-NL-F</b>	—

Notes

① See **Page V4-T3-127** for diagram of typical mounting.

② End fittings supplied only when required.

Approximate Dimensions in Inches (mm).

Type CXN



3

#### Type CXN Current Limiting Fuses 15.5 kV Maximum (14.4 kV Nominal)

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Catalog Number
						Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
45C	1	50	3.00 (76.2)	18.80 (477.5)	8 (3.63)	66674802	66675002	66665002	<b>15CXN-45C</b>
60C	1	50	3.00 (76.2)	18.80 (477.5)	8 (3.63)	66674802	66675002	66665002	<b>15CXN-60C</b>
75C	1	50	4.00 (101.6)	18.80 (477.5)	14 (6.36)	66674802	66675002	66665002	<b>15CXN-75C</b>
85C	1	50	4.00 (101.6)	18.80 (477.5)	14 (6.36)	66674802	66675002	66665002	<b>15CXN-85C</b>
100C	1	50	4.00 (101.6)	18.80 (477.5)	14 (6.36)	66674802	66675002	66665002	<b>15CXN-100C</b>
90C	2	50	3.00 (76.2)	18.80 (477.5)	16 (7.26)	66674804	66675004	66665002	2 X 45C <b>15CXN-90C</b>
120C	2	50	3.00 (76.2)	18.80 (477.5)	16 (7.26)	66674804	66675004	66665002	2 X 60C <b>15CXN-120C</b>
150C	2	50	4.00 (101.6)	18.80 (477.5)	28 (12.71)	66674804	66675004	66665002	2 X 75C <b>15CXN-150C</b>
175C	2	50	4.00 (101.6)	18.80 (477.5)	28 (12.71)	66674804	66675004	66665002	2 X 85C <b>15CXN-175C</b>

#### Type CXN Mountings and Hardware 15.5 kV Maximum (14.4 kV Nominal)

Ampere Rating	Fuse Mounting Type ①	Voltage LIWL (BIL)	Glass Polyester Insulator Mounting (Including Live Parts, End Fittings) ②	Live Parts ②	End Fittings (Disconnect Only)
			Catalog Number		
45C–60C Single barrel	Non-disconnect	95	<b>15CXN-GNM-D</b>	<b>15CXN-NL-D</b>	—
	Non-disconnect	95	<b>15CXN-GNM-G</b>	<b>15CXN-NL-G</b>	—
	Disconnect	95	<b>15CXN-GDM-G</b>	<b>15CXN-DL-G</b>	<b>15CXN-DF-G</b>
75C–100C Single barrel	Non-disconnect	95	<b>15CXN-GNM-F</b>	<b>15CXN-NL-F</b>	—
	Non-disconnect	95	<b>15CXN-GNM-G</b>	<b>15CXN-NL-G</b>	—
	Disconnect	95	<b>25CXN-GDM-G</b>	<b>15CXN-DL-G</b>	<b>15CXN-DF-G</b>
90C, 120C Double barrel	Non-disconnect	95	<b>15CXN-GNM-D</b>	<b>15CXN-NL-D</b>	—
150C, 175C Double barrel	Non-disconnect	95	<b>15CXN-GNM-F</b>	<b>15CXN-NL-F</b>	—

**Notes**

① See **Page V4-T3-127** for diagram of typical mounting.

② End fittings supplied only when required.

Approximate Dimensions in Inches (mm).

Type CXF

Type CXF Indicated Full-Range Current-Limiting Fuses Mountings and Hardware

Maximum Design Voltage (kV)	Ampere Rating	Mounting Fuse Mounting Type	Voltage BIL (kV)	Catalog Number	Live Parts Catalog Number	End Fittings Catalog Number
5.5	80–100	Non-disconnect	—	—	CXN-NL-G	—
	125–200	Disconnect	—	—	CXN-GL-G	CXN-DF-G
10	6–18	Non-disconnect	75	8CX-GNM-G	CX-NL	—
	20–50	Disconnect	75	8CX-GDM-G	CX-DL	CX-DF
8.3	65–80	Non-disconnect	—	—	CXN-NL-G	—
	100–125	Disconnect	—	—	CXN-DL-G	CXN-DF-G
17.2	6–18	Non-disconnect	95	15CX-GNM-G	CX-NL	—
	20–50	Disconnect	95	15CX-GDM-G	CX-DL	CX-DF
15.5	65–80	Non-disconnect	—	—	CXN-NL-G	—
	100	Disconnect	—	—	CXN-DL-G	CXN-DF-G
23	6–18	Non-disconnect	—	—	CX-NL	—
	20–50	Disconnect	—	—	CX-DL	CX-DF

# 3.5

## Power Breakers, Contactors and Fuses

### Current Limiting Fuses

#### Type DSL

3

6DSL-B1600

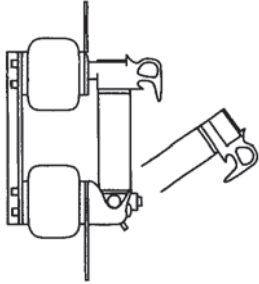


#### Type DSL Low Voltage Current Limiting Fuse

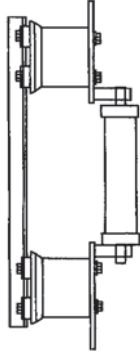
Fuse Type/Voltage	Interrupting Rating rms (kA Sym.)	Application Data (Time Current Curves)	Approximate Ship Wt. Lbs (kg)	Catalog Number
Type DSL fuse units 600V nominal	200	33-792 (2)	3.00 (1.4)	<b>6DSL-A150</b>
	200	33-792 (2)	3.00 (1.4)	<b>6DSL-A200</b>
	200	33-792 (2)	3.00 (1.4)	<b>6DSL-A250</b>
	200	33-792 (2)	3.00 (1.4)	<b>6DSL-A300</b>
	200	33-792 (2)	3.00 (1.4)	<b>6DSL-A400</b>
	200	33-792 (2)	3.00 (1.4)	<b>6DSL-A600</b>
	200	33-792 (2)	3.00 (1.4)	<b>6DSL-A800</b>
	200	33-792 (2)	4.00 (1.8)	<b>6DSL-B1200</b>
	200	33-792 (2)	4.00 (1.8)	<b>6DSL-B1600</b>
	200	33-792 (2)	4.00 (1.8)	<b>6DSL-B2000</b>
	200	33-792 (3)	5.50 (2.5)	<b>6DSL-C800</b>
	200	33-792 (3)	5.50 (2.5)	<b>6DSL-C1000</b>
	200	33-792 (3)	5.50 (2.5)	<b>6DSL-C1200</b>
	200	33-792 (3)	5.50 (2.5)	<b>6DSL-C1600</b>
	200	33-792 (3)	5.50 (2.5)	<b>6DSL-C2000</b>
	200	33-792 (3)	8.50 (3.9)	<b>6DSL-D2500</b>
	200	33-792 (3)	8.50 (3.9)	<b>6DSL-D3000</b>
	200	33-792	20.00 (9.1)	<b>6DSL-E2500</b>
	200	33-792	20.00 (9.1)	<b>6DSL-E3000</b>
	200	33-792	20.00 (9.1)	<b>6DSL-E4000</b>
	200	33-792	24.00 (10.9)	<b>6DSL-F5000</b>

**Typical Fuse Mounting for Current Limiting Fuses**

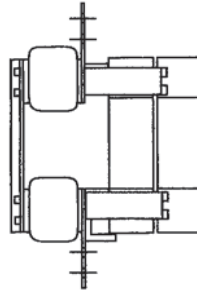
**Single Barrel Disconnect with 2.00-Inch (50.8 mm) Diameter CLE Fuses**



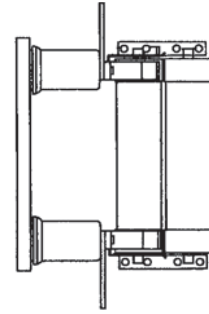
**Non-Disconnect (CX)**



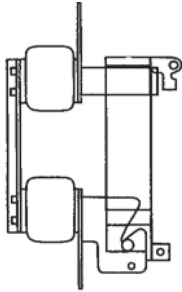
**Double-Barrel Non-Disconnect All 2.00-Inch (50.8 mm) and 3.00-Inch (76.2 mm) Diameter CL Fuses**



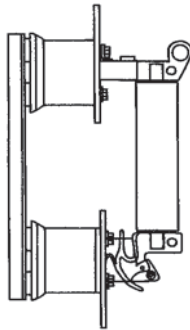
**Non-Disconnect (15CXN-GNM-F and 15CXN-GNM-D)**



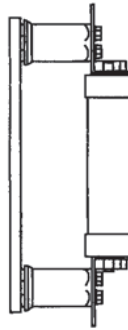
**Single Barrel Disconnect All 3.00-Inch (76.2 mm) Diameter CLE Fuses**



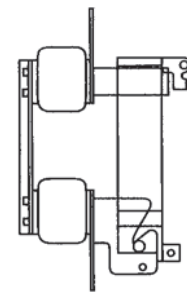
**Disconnect (CX)**



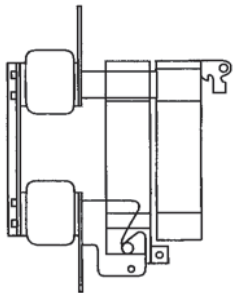
**Non-Disconnect (15CXN-GNM-G)**



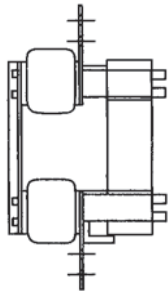
**Disconnect (15CXN-GNM-F)**



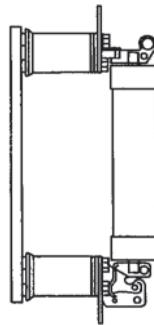
**Double Barrel Disconnect All 3.00-Inch (76.2 mm) Diameter CLE Fuses**



**Single-Barrel Non-Disconnect All 2.00-Inch (50.8 mm) and 3.00-Inch (76.2 mm) Diameter CL Fuses**

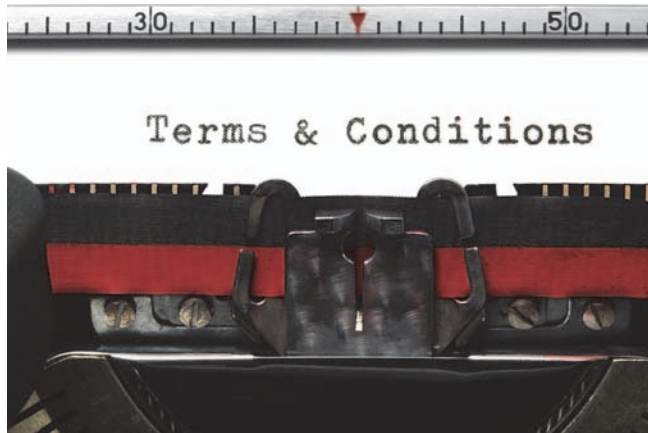


**Disconnect (15CXN-GNM-G)**





**Eaton Terms & Conditions**



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## Selling Policy (Supersedes Selling Policy 25-000, dated February 20, 2006)

### Terms and Conditions of Sale

The Terms and Conditions of Sale set forth herein, and any supplements which may be attached hereto, constitute the full and final expression of the contract for the sale of products or services (hereinafter referred to as Product(s) or Services by Eaton Corporation (hereinafter referred to as Seller) to the Buyer, and supersedes all prior quotations, purchase orders, correspondence or communications whether written or oral between the Seller and the Buyer. Notwithstanding any contrary language in the Buyer's purchase order, correspondence or other form of acknowledgment, Buyer shall be bound by these Terms and Conditions of Sale when it sends a purchase order or otherwise indicates acceptance of this contract, or when it accepts delivery from Seller of the Products or Services.

THE CONTRACT FOR SALE OF THE PRODUCTS OR SERVICES IS EXPRESSLY LIMITED TO THE TERMS AND CONDITIONS OF SALE STATED HEREIN. ANY ADDITIONAL OR DIFFERENT TERMS PROPOSED BY BUYER ARE REJECTED UNLESS EXPRESSLY AGREED TO IN WRITING BY SELLER. No contract shall exist except as herein provided.

### Complete Agreement

No amendment or modification hereto nor any statement, representation or warranty not contained herein shall be binding on the Seller unless made in writing by an authorized representative of the Seller. Prior dealings, usage of the trade or a course of performance shall not be relevant to determine the meaning of this contract even though the accepting or acquiescing party had knowledge of the nature of the performance and opportunity for objection.

### Quotations

Written quotations are valid for 30 days from its date unless otherwise stated in the quotation or terminated sooner by notice.

Verbal quotations, unless accepted, expire the same day they are made.

A complete signed order must be received by Seller within 20 calendar days of notification of award, otherwise the price and shipment will be subject to re-negotiation.

### Termination and Cancellation

Any order may be terminated by the Buyer only by written notice and upon payment of reasonable termination charges, including all costs plus profit.

Seller shall have the right to cancel any order at any time by written notice if Buyer breaches any of the terms hereof, becomes the subject of any proceeding under state or federal law for the relief of debtors, or otherwise becomes insolvent or bankrupt, generally does not pay its debts as they become due or makes an assignment for the benefit of creditors.

# Appendix 1—Eaton Terms & Conditions

Effective Date: November 1, 2008

## **Prices**

All prices are subject to change without notice. In the event of a price change, the effective date of the change will be the date of the new price or discount sheet, letter or telegram. All quotations made or orders accepted after the effective date will be on the new basis. For existing orders, the price of the unshipped portion of an order will be the price in effect at time of shipment.

## **Price Policy—Products and Services**

When prices are quoted as firm for quoted shipment, they are firm provided the following conditions are met:

1. The order is released with complete engineering details.
2. Shipment of Products are made, and Services purchased are provided within the quoted lead time.
3. When drawings for approval are required for any Products, the drawings applicable to those Products must be returned within 30\* calendar days from the date of the original mailing of the drawings by Seller. The return drawings must be released for manufacture and shipment and must be marked "APPROVED" or "APPROVED AS NOTED." Drawing re-submittals which are required for any other reason than to correct Seller errors will not extend the 30-day period.

\* 60 days for orders through contractors to allow time for their review and approval before and after transmitting them to their customers.

If the Buyer initiates or in any way causes delays in shipment, provision of Services or return of approval drawings beyond the periods stated above, the price of the Products or Services will be increased 1% per month or fraction thereof up to a maximum of 18 months from the date of the Buyer's order. For delays resulting in shipment or provision of Services beyond 18 months from the date of the Buyer's order, the price must be renegotiated.

## **Price Policy—BLS**

Refer to Price Policy 25-050.

## **Minimum Billing**

Orders less than \$1,000 will be assessed a shipping and handling charge of 5% of the price of the order, with a minimum charge of \$25.00 unless noted differently on Product discount sheets.

## **Taxes**

The price does not include any taxes. Buyer shall be responsible for the payment of all taxes applicable to, or arising from the transaction, the Products, its sale, value, or use, or any Services performed in connection therewith regardless of the person or entity actually taxed.

## **Terms of Payment**

### **Products**

Acceptance of all orders is subject to the Buyer meeting Seller's credit requirements. Terms of payment are subject to change for failure to meet such requirements. Seller reserves the right at any time to demand full or partial payment before proceeding with a contract of sale as a result of changes in the financial condition of the Buyer. Terms of Payment are either Net 30 days from the date of invoice of each shipment or carry a cash discount based on Product type. Specific payment terms for Products are outlined in the applicable Product discount schedules.

### **Services**

Terms of payment are net within 30 days from date of invoice for orders amounting to less than \$50,000.00.

Terms of payment for orders exceeding \$50,000.00 shall be made according to the following:

1. Twenty percent (20%) of order value with the purchase order payable 30 days from date of invoice.
2. Eighty percent (80%) of order value in equal monthly payments over the performance period payable 30 days from date of invoice.

Except for work performed (i) under a firm fixed price basis or (ii) pursuant to terms of a previously priced existing contract between Seller and Buyer, invoices for work performed by Seller shall have added and noted on each invoice a charge of 3% (over and above the price of the work) which is related to Seller compliance with present and proposed environmental, health, and safety regulations associated with prescribed requirements covering hazardous materials management and employee training, communications, personal protective equipment, documentation and record keeping associated therewith.

### **Adequate Assurances**

If, in the judgment of Seller, the financial condition of the Buyer, at any time during the period of the contract, does not justify the terms of payment specified, Seller may require full or partial payment in advance.

### **Delayed Payment**

If payments are not made in accordance with these terms, a service charge will, without prejudice to the right of Seller to immediate payment, be added in an amount equal to the lower of 1.5% per month or fraction thereof or the highest legal rate on the unpaid balance.

**Freight**

Freight policy will be listed on the Product discount sheets, or at option of Seller one of the following freight terms will be quoted.

**F.O.B.—P/S—Frt./Ppd. and Invoiced**

Products are sold F.O.B. point of shipment freight prepaid and invoiced to the Buyer.

**F.O.B.—P/S—Frt./Ppd. and Allowed**

Products sold are delivered F.O.B. point of shipment, freight prepaid and included in the price.

**F.O.B. Destination—Frt./Ppd. and Allowed**

At Buyer's option, Seller will deliver the Products F.O.B. destination freight prepaid and 2% will be added to the net price.

The term "freight prepaid" means that freight charges will be prepaid to the accessible common carrier delivery point nearest the destination for shipments within the United States and Puerto Rico unless noted differently on the Product discount sheets. For any other destination contact Seller's representative.

**Shipment and Routing**

Seller shall select the point of origin of shipment, the method of transportation, the type of carrier equipment and the routing of the shipment.

If the Buyer specifies a special method of transportation, type of carrier equipment, routing, or delivery requirement, Buyer shall pay all special freight and handling charges.

When freight is included in the price, no allowance will be made in lieu of transportation if the Buyer accepts shipment at factory, warehouse, or freight station or otherwise supplies its own transportation.

**Risk of Loss**

Risk of loss or damage to the Products shall pass to Buyer at the F.O.B. point.

**Concealed Damage**

Except in the event of F.O.B. destination shipments, Seller will not participate in any settlement of claims for concealed damage.

When shipment has been made on an F.O.B. destination basis, the Buyer must unpack immediately and, if damage is discovered must:

1. Not move the Products from the point of examination.
2. Retain shipping container and packing material.
3. Notify the carrier in writing of any apparent damage.
4. Notify Seller representative within 72 hours of delivery.
5. Send Seller a copy of the carrier's inspection report.

**Witness Tests/Customer Inspection**

Standard factory tests may be witnessed by the Buyer at Seller's factory for an additional charge calculated at the rate of \$2,500 per day (not to exceed eight (8) hours) per Product type. Buyer may final inspect Products at the Seller's factory for \$500 per day per Product type.

Witness tests will add one (1) week to the scheduled shipping date. Seller will notify Buyer fourteen (14) calendar days prior to scheduled witness testing or inspection. In the event Buyer is unable to attend, the Parties shall mutually agree on a rescheduled date. However, Seller reserves the right to deem the witness tests waived with the right to ship and invoice Products.

**Held Orders**

For any order held, delayed or rescheduled at the request of the Buyer, Seller may, at its sole option (1) require payment to be based on any reasonable basis, including but not limited to the contract price, and any additional expenses, or cost resulting from such a delay; (2) store Products at the sole cost and risk of loss of the Buyer; and/or (3) charge to the Buyer those prices under the applicable price policy. Payment for such price, expenses and costs, in any such event, shall be due by Buyer within thirty (30) days from date of Seller's invoice. Any order so held delayed or rescheduled beyond six (6) months will be treated as a Buyer termination.

**Drawing Approval**

Seller will design the Products in line with, in Seller's judgment, good commercial practice. If at drawing approval Buyer makes changes outside of the design as covered in their specifications, Seller will then be paid reasonable charges and allowed a commensurate delay in shipping date based on the changes made.

**Drawing Re-Submittal**

When Seller agrees to do so in its quotation, Seller shall provide Buyer with the first set of factory customer approval drawing(s) at Seller's expense. The customer approval drawing(s) will be delivered at the quoted delivery date. If Buyer requests drawing changes or additions after the initial factory customer approval drawing(s) have been submitted by Seller, the Seller, at its option, may assess Buyer drawing charges. Factory customer approval drawing changes required due to misinterpretation by Seller will be at Seller's expense. Approval drawings generated by Bid Manager are excluded from this provision.

**Warranty****Warranty for Products**

Seller warrants that the Products manufactured by it will conform to Seller's applicable specifications and be free from failure due to defects in workmanship and material for one (1) year from the date of installation of the Product or eighteen (18) months from the date of shipment of the Product, whichever occurs first.

In the event any Product fails to comply with the foregoing warranty Seller will, at its option, either (a) repair or replace the defective Product, or defective part or component thereof, F.O.B. Seller's facility freight prepaid, or (b) credit Buyer for the purchase price of the Product. All warranty claims shall be made in writing.

Seller requires all non-conforming Products be returned at Seller's expense for evaluation unless specifically stated otherwise in writing by Seller.

This warranty does not cover failure or damage due to storage, installation, operation or maintenance not in conformance with Seller's recommendations and industry standard practice or due to accident, misuse, abuse or negligence. This warranty does not cover reimbursement for labor, gaining access, removal, installation, temporary power or any other expenses, which may be incurred in connection with repair or replacement.

This warranty does not apply to equipment not manufactured by Seller. Seller limits itself to extending the same warranty it receives from the supplier.

# Appendix 1—Eaton Terms & Conditions

Effective Date: November 1, 2008

## **Extended Warranty for Products**

If requested by the Buyer and specifically accepted in writing by Seller, the foregoing standard warranty for Products will be extended from the date of shipment for the period and price indicated below:

- 24 months—2% of Contract Price
- 30 months—3% of Contract Price
- 36 months—4% of Contract Price

## **Special Warranty (In and Out) for Products**

If requested by the Buyer and specifically accepted in writing by Seller, Seller will, during the warranty period for Products, at an additional cost of 2% of the contract price, be responsible for the direct cost of:

1. Removing the Product from the installed location.
2. Transportation to the repair facility and return to the site.
3. Reinstallation on site.

The total liability of Seller for this Special Warranty for Products is limited to 50% of the contract price of the particular Product being repaired and excludes expenses for removing adjacent apparatus, walls, piping, structures, temporary service, etc.

## **Warranty for Services**

Seller warrants that the Services performed by it hereunder will be performed in accordance with generally accepted professional standards.

The Services, which do not so conform, shall be corrected by Seller upon notification in writing by the Buyer within one (1) year after completion of the Services.

Unless otherwise agreed to in writing by Seller, Seller assumes no responsibility with respect to the suitability of the Buyer's, or its customer's, equipment or with respect to any latent defects in equipment not supplied by Seller. This warranty does not cover damage to Buyer's, or its customer's, equipment, components or parts resulting in whole or in part from improper maintenance or operation or from their deteriorated condition. Buyer will, at its cost, provide Seller with unobstructed access to the defective Services, as well as adequate free working space in the immediate vicinity of the defective Services and such facilities and systems, including, without limitation, docks, cranes and utility disconnects and connects, as may be necessary in order that Seller may perform its warranty obligations. The conducting of any tests shall be mutually agreed upon and Seller shall be notified of, and may be present at, all tests that may be made.

## **Warranty for Power Systems Studies**

Seller warrants that any power systems studies performed by it will conform to generally accepted professional standards. Any portion of the study, which does not so conform, shall be corrected by Seller upon notification in writing by the Buyer within six (6) months after completion of the study. All warranty work shall be performed in a single shift straight time basis Monday through Friday. In the event that the study requires correction of warranty items on an overtime schedule, the premium portion of such overtime shall be for the Buyer's account.

## **Limitation on Warranties for Products, Services and Power Systems Studies**

THE FOREGOING WARRANTIES ARE EXCLUSIVE EXCEPT FOR WARRANTY OF TITLE. SELLER DISCLAIMS ALL OTHER WARRANTIES INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

CORRECTION OF NON-CONFORMITIES IN THE MANNER AND FOR THE PERIOD OF TIME PROVIDED ABOVE SHALL CONSTITUTE SELLER'S SOLE LIABILITY AND BUYER'S EXCLUSIVE REMEDY FOR FAILURE OF SELLER TO MEET ITS WARRANTY OBLIGATIONS, WHETHER CLAIMS OF THE BUYER ARE BASED IN CONTRACT, IN TORT (INCLUDING NEGLIGENCE OR STRICT LIABILITY), OR OTHERWISE.

## **Asbestos**

Federal Law requires that building or facility owners identify the presence, location and quantity of asbestos containing material (hereinafter "ACM") at work sites. Seller is not licensed to abate ACM. Accordingly, for any contract which includes the provision of Services, prior to (i) commencement of work at any site under a specific Purchase Order, (ii) a change in the work scope of any Purchase Order, the Buyer will certify that the work area associated with the Seller's scope of work includes the handling of Class II ACM, including but not limited to generator wedges and high temperature gaskets which include asbestos materials. The Buyer shall, at its expense, conduct abatement should the removal, handling, modification or reinstallation, or some or all of them, of said Class II ACM be likely to generate airborne asbestos fibers; and should such abatement affect the cost of or time of performance of the work then Seller shall be entitled to an equitable adjustment in the schedule, price and other pertinent affected provisions of the contract.

## **Compliance with Nuclear Regulation**

Seller's Products are sold as commercial grade Products not intended for application in facilities or activities licensed by the United States Nuclear Regulatory Commission for atomic purposes. Further certification will be required for use of the Products in any safety-related application in any nuclear facility licensed by the U.S. Nuclear Regulatory Commission.

**Returning Products**

Authorization and shipping instructions for the return of any Products must be obtained from Seller before returning the Products.

When return is occasioned due to Seller error, full credit including all transportation charges will be allowed.

**Product Notices**

Buyer shall provide the user (including its employees) of the Products with all Seller supplied Product notices, warnings, instructions, recommendations, and similar materials.

**Force Majeure**

Seller shall not be liable for failure to perform or delay in performance due to fire, flood, strike or other labor difficulty, act of God, act of any governmental authority or of the Buyer, riot, embargo, fuel or energy shortage, car shortage, wrecks or delays in transportation, or due to any other cause beyond Seller's reasonable control. In the event of delay in performance due to any such cause, the date of delivery or time for completion will be extended by a period of time reasonably necessary to overcome the effect of such delay.

**Liquidated Damages**

Contracts which include liquidated damage clauses for failure to meet shipping or job completion promises are not acceptable or binding on Seller, unless such clauses are specifically accepted in writing by an authorized representative of the Seller at its headquarters office.

**Patent Infringement**

Seller will defend or, at its option, settle any suit or proceeding brought against Buyer, or Buyer's customers, to the extent it is based upon a claim that any Product or part thereof, manufactured by Seller or its subsidiaries and furnished hereunder, infringes any United States patent, other than a claim of infringement based upon use of a Product or part thereof in a process, provided Seller is notified in reasonable time and given authority, information and assistance (at Seller's expense) for the defense of same. Seller shall pay all legal and court costs and expenses and court-assessed damages awarded therein against Buyer resulting from or incident to such suit or proceeding. In addition to the foregoing, if at any time Seller determines there is a substantial question of infringement of any United States patent, and the use of such Product is or may be enjoined, Seller may, at its option and expense: either (a) procure for Buyer the right to continue using and selling the Product; (b) replace the Product with non-infringing apparatus; (c) modify the Product so it becomes non-infringing; or (d) as a last resort, remove the Product and refund the purchase price, equitably adjusted for use and obsolescence. In no case does Seller agree to pay any recovery based upon its Buyer's savings or profit through use of Seller's Products whether the use be special or ordinary. The foregoing states the entire liability of Seller for patent infringement.

The preceding paragraph does not apply to any claim of infringement based upon: (a) any modification made to a Product other than by Seller; (b) any design and/or specifications of Buyer to which a Product was manufactured; or (c) the use or combination of Product with other products where the Product does not itself infringe. As to the above-identified claim situations where the preceding paragraph does not apply, Buyer shall defend and hold Seller harmless in the same manner and to the extent as Seller's obligations described in the preceding paragraph. Buyer shall be responsible for obtaining (at Buyer's expense) all license rights required for Seller to be able to use software products in the possession of Buyer where such use is required in order to perform any Service for Buyer.

With respect to a Product or part thereof not manufactured by Seller or its subsidiaries, Seller will attempt to obtain for Buyer, from the supplier(s), the patent indemnification protection normally provided by the supplier(s) to customers.

**Compliance with OSHA**

Seller offers no warranty and makes no representation that its Products comply with the provisions or standards of the Occupational Safety and Health Act of 1970, or any regulation issued thereunder. In no event shall Seller be liable for any loss, damage, fines, penalty or expenses arising under said Act.

**Limitation of Liability**

THE REMEDIES OF THE BUYER SET FORTH IN THIS CONTRACT ARE EXCLUSIVE AND ARE ITS SOLE REMEDIES FOR ANY FAILURE OF SELLER TO COMPLY WITH ITS OBLIGATIONS HEREUNDER.

NOTWITHSTANDING ANY PROVISION IN THIS CONTRACT TO THE CONTRARY, IN NO EVENT SHALL SELLER BE LIABLE IN CONTRACT, IN TORT (INCLUDING NEGLIGENCE OR STRICT LIABILITY) OR OTHERWISE FOR DAMAGE TO PROPERTY OR EQUIPMENT OTHER THAN PRODUCTS SOLD HEREUNDER, LOSS OF PROFITS OR REVENUE, LOSS OF USE OF PRODUCTS, COST OF

CAPITAL, CLAIMS OF CUSTOMERS OF THE BUYER OR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES WHATSOEVER, REGARDLESS OF WHETHER SUCH POTENTIAL DAMAGES ARE FORESEEABLE OR IF SELLER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

THE TOTAL CUMULATIVE LIABILITY OF SELLER ARISING FROM OR RELATED TO THIS CONTRACT WHETHER THE CLAIMS ARE BASED IN CONTRACT, IN TORT (INCLUDING NEGLIGENCE OR STRICT LIABILITY) OR OTHERWISE, SHALL NOT EXCEED THE PRICE OF THE PRODUCT OR SERVICES ON WHICH SUCH LIABILITY IS BASED.

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